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VETERINARY MEDICINE

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JUNE 1935

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D. M. Campbell, Editor A. T. Kinsley, Associate Editor
H. J. Mostyn, R.K.O. Bldg., New York, Eastern Representative

A South African zoo has three baby lion-tigers, offspring of a father lion and mother tiger.—*S. N. L.*, 27:734.

Himwich and Fazikas of Yale University report that the brain gets its energy for thinking from glucose.

Kyer and Bethel of the Simpson Memorial Institute report that vitamin B_4 apparently can prevent anemia by stimulating the formation of red blood cells.

Dinitrophenol, the popular anti-obesity treatment at the present time, according to Harger and Hulpier of the University of Indiana, will sober up intoxicated dogs in less than half the time that this phenomenon occurs naturally. It is deduced from their experiments that it may have a similar effect on the ordinary jag.

According to C. I. Reed, of the University of Illinois College of Medicine, vitamin D is of great benefit in the treatment of arthritis (or rheumatism). Seventy of 100 arthritic patients treated by Doctor Reed and associates were definitely helped and some of them apparently cured by the administration of enormous doses of the rickets-preventive vitamin. All kinds of arthritis, except that due to gonorrhea were helped.

Pennsylvania School Celebrates Semi-Centennial

The School of Veterinary Medicine of the University of Pennsylvania held a celebration May 17th and 18th, of the fiftieth anniversary of its establishment. The school was authorized in 1882, and opened for instruction October, 1884.

The program included the presentation of a bronze bust of the late Dr. Leonard Pearson, a graduate of the school in 1890, and dean from 1897 to 1909. The Pearson Memorial was accepted on behalf of the school by Dr. Thomas S. Gates, president of the University.

The honorary degree of Doctor of Science was conferred upon Drs. Louis A. Klein and C. J. Marshall of the University, and Dr. L. Van Es of the University of Nebraska. The honorary degree of Doctor of Laws was conferred upon J. Bertram Lippincott. Mr. Lippincott is a member of the family of Philadelphia publishers, the founder of which, J. B. Lippincott, donated $10,000 for the establishment of the veterinary school.

The program of this celebration included a clinic conducted by students of the school; a program on milk hygiene, and a visit to a number of dairy farms. The principal address of the celebration was made by Doctor Van Es.

Charles Allen Cary

Wednesday morning, April 24th, C. A. Cary was found dead in his bed, at the age of 73. He had been suffering for a few days from what was regarded as a light at-

tack of influenza, but had continued his work at the college. His sudden death was wholly unexpected.

For upwards of 40 years, Doctor Cary had been an important and colorful national figure in veterinary medicine. His life was an exemplification of the soundness of the advice given Benjamin Franklin by a Quaker friend: "Drive thy business. Let not thy business drive thee." Cary drove his business—his professional work, and drove it hard—and with substantial results. Few names have illuminated more chapters of American veterinary history, and none has occupied the place of commanding importance in the live stock industry of the south, that he occupied.

In a professional life and an official capacity, marked with strife pretty much all the way through, no opponent of Doctor Cary's whether successful or defeated, was ever left with other than the highest respect for his integrity and fairness, and it may be added, for his fighting qualities. He sometimes fought for wrong causes, but he fought fairly and always conscientiously. He believed them right.

Cary seemed destined for leadership. To begin with, he was a member of the famous class of the Veterinary Division of the Iowa State College of 1885. In a class of seven, five, Sesco Stewart, George H. Glover, E. E. Sayers, W. B. Niles and C. A. Cary, achieved national distinction. Cary did not graduate with the class; in fact, he was officially enrolled in the agricultural school of the college that year, but he was a member of the class just the same. At that time, the veterinary course at Ames, and elsewhere, was ungraded; all the students attended the same lectures, and the little matter of being enrolled in another department, was not a hindrance in those free and easy days. Cary graduated from the Veterinary Department two years later, and during the next five years, his changes of location were as frequent as they were infrequent during the past 40 years.

Following graduation, he practiced in Keokuk, Iowa, then in Illinois; next in Missouri and back to Iowa again by 1890. He then went to the Agricultural College at South Dakota as Professor of Veterinary Science and the next year attended lectures at veterinary schools in Berlin, Vienna, Munich, Stuttgart and Brussels. Returning to the United States in 1893, he was elected Professor of Veterinary Science at the Alabama Polytechnic Institute, at Auburn, which position he held for 42 years. In 1907 when the office of State Veterinarian of Alabama was created, Cary was selected for that in addition to his college work, and this position he held uninterruptedly for 28 years. In the same year, the College of Veterinary Medicine of the Alabama Polytechnic Institute was inaugurated and Cary was made dean. This position he held also until his death. Emphatically, he was "the crew of the Nancy Brig."

From the time of his arrival in Alabama, he massed all his professional knowledge and skill, and spent of his tremendous energy to the limit, in a drive to improve the live stock industry, particularly live stock sanitation in Alabama, and with conspicuous success. The live stock sanitary code of Alabama has been copied by other southern states and parts of it by many northern states. The College of Veterinary Medicine, he managed without a division of labor or authority and carried a heavy teaching assignment as well.

Nor were his activities confined to his duties as head of the veterinary division of

the Alabama Experiment Station, dean of the College of Veterinary Medicine of the Alabama Polytechnic Institute, professor of two major departments, State Veterinarian of Alabama and secretary of the State Veterinary Examining Board. He gave much time and energy to association work. For for than 25 years, he was president of the Alabama Live Stock Association, and for an equal term, director of the Summer School for Farmers at the Alabama Polytechnic Institute. At the time of his death, and for many years, he was, in effect, the permanent secretary-treasurer and unofficial general manager of the Alabama Veterinary Medical Association. He served as president of both the United States Live Stock Sanitary Association (1927-28) and of the American Veterinary Medical Association (1919-20), and, at one time or another, on practically all the important committees of both associations, including membership on the Executive Board of the latter association. It would require a page to chronical his committee assignments alone. In 1913, he was elected president of the Southern Association of Agricultural Workers.

He was responsible (in 1896) for establishing at Montgomery, Alabama, the first comprehensive city meat and milk inspection system in the United States, and he pushed this work throughout his career in Alabama, to the end that all the large and most of the small cities of the state now have veterinary meat inspection, and many of them veterinary milk inspection also. None was ever more insistent than he upon veterinarians for veterinary jobs. He directed the research which developed the schedule of dippings necessary to free a district of fever ticks.

Doctor Cary's writings were chiefly bulletins of the Alabama Polytechnic Institute, or the Alabama Agricultural Experiment Station, or press releases from these stations for the newspapers of the state. However, he contributed presidential addresses and committee reports in about all of the professional and scientific associations of which he was a member.

But, it was in the field of politics, for which he had a flare, that Cary was perhaps best known outside of Alabama and by no means unknown within the state. He was said to know more persons of consequence in Alabama than any other citizen, and not long since, he told the writer that he was personally acquainted with every member of the Alabama legislature at that time, and had known a number of the members from childhood. Politically, his position was impregnable in Alabama. Only a few years ago, when a difference of opinion arose between him and the president of the Alabama Polytechnic Institute, as to the management of the College of Veterinary Medicine, the institution dispensed with its president, an outcome that Cary foretold when the controversy started.

He wrote the live stock sanitary laws of Alabama, unaided; the legislature merely ok'd them. He wrote the regulations and enforced both measures like a dictator. This explains why the cattle tick quarantine was lifted first in Alabama among the states in the far south. Alabama never had any money to pay indemnities on tuberculin reactors, and therefore no Federal money was available for indemnities in the state either; but, nevertheless, without the payment of indemnities, Cary was able to carry on the work of tuberculosis eradication and slaughter reactors at the owner's expense and make fair progress. Could any other state live stock sanitary authority have done as much? None did.

In the United States Live Stock Sanitary Association, Cary was politically unbeatable. Alabama is an importing state. Exporting states did not like his regulations. He was the first to demand a certificate of freedom from Bang's disease for the importation of cows, and first to require that imported chickens be free from tuberculosis. Exporting states and railroads tried to force a modification of his stringent regulations. The floor of the U. S. L. S. S. A. was a forum for these debates. Cary successfully stood his ground, always, and in time, most of those who opposed him, adopted the same regulations for their own states.

In recent years, his activities in the A. V.

M. A. had been largely concerned in keeping his school, and with it, several of the weaker schools, on the accredited list. The record testifies to his success. His activities in this respect has had the effect of retarding the progress of the veterinary profession and restraining improvement in veterinary education. Cary realized this, but regarded it of less importance than that veterinarians be trained for the live stock industry of the south. He maintained to the end that veterinarians raised in the North and trained in northern schools did not make successful southern practitioners, and that the welfare of the South demanded the maintenance of southern veterinary schools. Alabama had little money with which to maintain the state government and state institutions. There are no great property interests to assess, other than the steel companies at Birmingham and the railroads. The meager state funds had to be spread exceedingly thin to cover the needs, and when they reached the veterinary college, in spite of all that Cary could do, were inadequate. Cary made the best of the funds available and insisted, successfully, that the A. V. M. A. must accept his best and the best of the other schools in like position, and it did.

Innumerable instances could be cited to illustrate Cary's political acumen, his resourcefulness, his steadfastness and his dependability. A single one, continuing over two meetings of the A. V. M. A., will suffice.

When it was decided to hold the annual meeting of the A. V. M. A. in Kansas City in 1931, a movement was undertaken to elect N. F. Williams of Texas, president. In the beginning, Doctor Williams was sort of a personal candidate of Doctor Graham of Kansas City. In political parlance, his election looked like a "cinch." Williams was extremely popular in Texas and Oklahoma. Kinsley of Kansas City was counted upon to bring him the support of Missouri and Kansas, sufficient help from Nebraska and Iowa to make his election certain. Texas and Oklahoma veterinarians took the matter up enthusiastically, but

"The best-laid schemes 'o mice an' men
Gang aft agley,
An' lea's us nought but grief an' pain,
For promis'd joy"

When the Kansas Association met in January, R. R. Dykstra's name was entered in the contest and with S. L. Stewart solidly behind him, the Kansas delegation would be split. Kinsley was ham-strung; he could not oppose Dykstra. Within a few months, Dykstra looked like a runaway candidate. Ames was backing him, Iowa was in line; he was getting better than an even break in the East. A caucus was called at College Station and Cary was sent for; his loyalty as a Southron appealed to and the splendid qualifications of Williams for the office, stressed. Cary's advice was: "Soft peddle the William's candidacy; trade Dykstra votes for votes for Atlanta for the next meeting place." He also assured them of his support for Williams if the next meeting were held at Atlanta. It was well known that, at Atlanta, he could name the president. The election would be merely a formality. This was done, and it worked, as Cary's plans usually worked; and then he was called upon to bear perhaps the severest cross of his political career. The "eastern crowd"-were opposed to Williams. They regarded attempts to defeat him at Atlanta futile if Cary supported him. They wanted MacKellar, but most of all, they did not want Williams. So, word was sent Cary from a meeting in Philadelphia at the time of the veterinary conference there, that the "eastern crowd" wanted to support Sims at Atlanta. This put Cary distinctly on the spot. Sims was his favorite among the alumni of his school, a man well qualified for president, and for whom Cary had long had an ambition to see him just that. The easterners also owed Sims the position. He had stepped aside at the Portland meeting to permit the election of Adams. They hoped, thus, to defeat Williams and pay a debt at one and the same time. The writer was present when this message was delivered to Cary. Cary was nearly crushed, but his reply was characteristic: "There is no man in the United States I want so much to see elected presi-

dent of the A. V. M. A. as Sims, and most of all, I want to see him elected at a southern meeting, but I have given my word to support Williams at Atlanta and I will—he will be elected." And he was, and made one of the dozen best presidents the A. V. M. A. has had. Cary's word was just 100 per cent good.

A humorous occurrence in connection with this election is worth telling. Prior to the 1932 meeting of the A. V. M. A., the Texas veterinarians raised a sizeable campaign fund and sent it to Atlanta. When the meeting was over, the local committee had considerable unexpended funds on hand and the matter of making a refund to contributors in proportion to the amount contributed was taken up. The Texas committee wrote for their "dividend," and were rather pointedly told that it was the entertainment fund that contained a surplus; that the campaign fund was all expended, and "your candidate was elected and you ought to be satisfied. What did you expect, anyway?" Cary is thought to have been consulted before the reply was drafted.

Cary's personal influence in the A. V. M. A. was probably not exceeded by that of any other member. Of recent years, he had been referred to as the "watch dog of the treasury," again as the "guardian of the constitution." For a long time, the majority of the members of the A. V. M. A. regarded it as illogical that the headquarters should be in a border city, and finally in 1928 it was voted to move the headquarters of the association to Chicago. It did not happen. From then on, at each annual meeting of the A. V. M. A. and at each annual meeting of the Executive Board in Chicago in December, it was "understood," and usually voted, that the association would move its headquarters, forthwith, to Chicago. The headquarters remained at Detroit and would be there yet but for the personal influence of Doctor Cary, who announced at the Kansas City meeting that the move had got to be made, and followed it up at the succeeding meeting of the Executive Board with such forcefulness that it was made.

We shall miss him a lot at the A. V. M. A. meeting at Oklahoma City next August and at meetings for years to come. He attended

Dr. C. A. Cary (left) and Dr. N. F. Williams at the Atlanta (1932) Meeting of the A. V. M. A.

all meetings of the Association and took part in practically all important debates. It will seem strange not to see him rise from his seat in the front row and announce in his nasal twang (in 40 years in the Southland, he acquired not the slightest suspicion of a below-the-Mason-and-Dixon-line accent), "You fellows can't get away with that; I won't stand for it."

Because the group is smaller, he will be missed even more at the U. S. L. S. S. A. meeting in Chicago in December and at future meetings of that association.

Doctor Cary is survived by his widow, a son, two daughters and two brothers. Interment was at Auburn. Members of the Veterinary faculty were pallbearers.

The Specific Chemo-Therapy of Milk Fever by the Parenteral Administration of Calcium Boro-Gluconate*

By H. DRYERRE and J. RUSSELL GREIG
The Moredun Research Institute, Animal Diseases Research Association, Edinburgh, Scotland

FOLLOWING upon our publication, in 1925, of the parathyroid deficiency (hypocalcemia) theory, numerous investigators, including Little and Wright, Sjollema, Hayden and Fish and ourselves, have furnished a large volume of evidence supporting the view that an acute hypocalcemia is the immediate cause of the milk fever attack. The writers have also shown that the curative action of mammary inflation is due to its effect in rapidly raising the blood-calcium concentration. In order to obtain further evidence bearing upon this point, it was resolved to test the curative effect of the parenteral injection of calcium in cases of the disease.

Inorganic salts of calcium, such as the chloride, when injected subcutaneously, are notoriously caustic, but a comparatively bland preparation of calcium was found in the gluconate $(C_5H_{11}O_5COO)_2Ca$. (Sandoz). An unforeseen obstacle was, however, encountered in the reluctance of veterinary practitioners to experiment with a hitherto untried treatment, when one of almost specific efficacy, that of mammary inflation, was in their hands. After considerable difficulty, we, however, eventually obtained the services of a firm of insurance agents who were prepared to effect a special form of insurance to cover the value of cases of milk fever experimentally treated by calcium therapy.

The results of the first group of experiments proved that cases of milk fever made a rapid, even a spectacular curative response to the injection of calcium gluconate, given either by the intravenous or the subcutaneous route, provided that an adequate dose were administered.

In these experiments, widely varying amounts of calcium were injected, and it was ultimately determined that two ounces† of calcium gluconate could be regarded as the "standard dose." By the term "standard dose" is implied that dose upon which reliance may be placed in the treatment of all cases of milk fever in the cow. In a considerable number of cases the blood calcium concentration may be relatively high, e. g., 6mgms per 100cc serum; in such instances, one ounce, or even less, may be sufficient to effect recovery. On the other hand, the calcium content may be as low as 3mg per 100cc serum, in which case the administration of any amount less than two ounces of calcium gluconate may prove inadequate. Since there is no clinical method by which the practitioner can readily determine the blood calcium concentration which obtains in a particular case, and as the administration of an excess amount of calcium is harmless, it is proper that he should administer a standard dose upon which he can always with confidence depend.

The standard dose having been determined, one of us was responsible for urging the extensive adoption of the new treatment, since it apparently possessed several advantages over mammary inflation. A comparatively small number of practitioners elected to employ calcium therapy by the intravenous method of administration; these reported almost invariable success, although, in a number of instances, very rapid recovery was followed by relapse. In the majority of cases, the subcutaneous route was adopted and, while by this method a rapid and complete recovery was almost without exception effected, a number of practitioners reported that, upon occasion, such untoward complications as subcutaneous edema, abscess formation, and even extensive necrosis, developed at the site of injection.

*Translated with Special Permission from the *Medlemsblad for Den danske Dyrlaegeforening.*

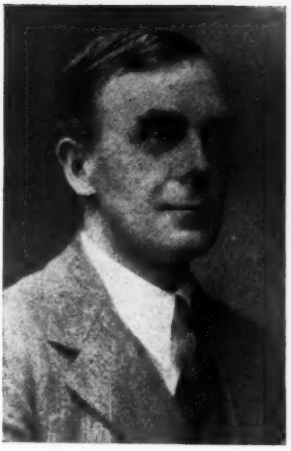
† The word "ounce" as it occurs throughout the text refers to the ounce apothecary, i.e. 480 grains.

These occurrences occasioned grave concern, since they not only constituted a serious obstacle to the general adoption of the treatment, but, in several instances, they proved detrimental to the reputation of the practitioner. Such a condition of affairs obviously demanded careful investigation, and reports received from many practitioners in Europe and America were collected and carefully collated, and the techniques employed by practitioners who seldom, if ever, encountered local reactions were compared with the methods of those whose experience was of a contrary character.

It was soon apparent that the subcutaneous injection of calcium gluconate at concentrations higher than five per cent was undesirable, in that its use increased the risk of serious local reaction. This required that, in order to introduce safely the requisite dose (two ounces) of calcium gluconate, it was necessary to inject subcutaneously at least two pints of solution. Hepburn found that even so large a volume of fluid was absorbed readily if it were injected at a temperature of 115°F.—a procedure which, however, frequently incurred considerable inconvenience under the conditions which obtain on the farm.

Experimental cattle were injected subcutaneously and intramuscularly with solutions of calcium gluconate in excess of 10 per cent concentration, prepared and administered at the Moredun Institute under strict aseptic precautions. The results of these experiments indicated that such local reactions as were encountered were due, not to septic infection, but to precipitation of the salt at the site of injection. Strong aqueous solutions of calcium gluconate are supersaturated and, therefore, very unstable, and so tend to precipitate readily. It was found that if solutions were filtered immediately after their preparation, the risk of precipitation appeared to be reduced, but, since solutions could not be prepared in bulk, the preparation of a hot filtered solution for each individual case involved considerable trouble and inconvenience.

At this time, a number of specially prepared solutions of calcium compounds for the treatment of milk fever were produced commercially. These solutions were of comparatively small volume, and were prepared in such a form that they could be administered with facility, but their general use was precluded for one or the other of two reasons, i.e., either they were too costly, or their content of calcium element was quite inadequate and of no value other than as relatively unimportant auxiliaries to mammary inflation.



Prof. J. Russell Greig

The position, then, was that while we had definite and abundant evidence that the parenteral injection of calcium gluconate was a treatment of specific, curative efficacy, and one which appeared to possess several distinct advantages over mammary inflation, its employment involved either considerable expense in the purchase of specially concentrated solutions, or it required much care and trouble in the case of solutions prepared extemporaneously. The difficulty has been resolved by the discovery by Hayden that a solution of boric acid is a powerful solvent for calcium gluconate. The addition of this substance readily renders soluble concentrations, of even 40 per cent of the salt, while 20 per cent solutions may be kept for many months without precipitation. This knowledge now permits us to prepare readily stock solutions, which can be kept

until required for use, and the individual injections may now be markedly reduced in volume. Subcutaneous injections of calcium gluconate solutions in combination with boric acid are absorbed rapidly, without trace of local irritation. Further, it has been shown by laboratory tests which we have had conducted recently that the addition of boric acid renders the injection relatively antiseptic. One of us, therefore, suggested the following formula for use as a subcutaneous injection in the treatment of milk fever:

Calcium gluconate	℥ii
Boric acid	℥iii
Water	℥xii

The solution is boiled, but need not be filtered.

This is now being adopted largely in general practice in Great Britain and abroad, with uniformly excellent results.

The solution is, with advantage, injected at a temperature of 105°F., but since the volume of fluid is relatively small, it will be found that in actual practice the solution need not necessarily be warmed, although a warmed solution is much more readily absorbed.

Since the solution is stable, it may, as has been indicated, be prepared in bulk, and this removes the troublesome necessity of preparing a solution for the treatment of each case to which the practitioner is called. Fungal growth in stock solutions may be prevented by the addition of a 25 per cent solution of thymol in alcohol (90%), two drops being added for each three ounces of the stock solution.

It is hoped that it may soon be possible to obtain "calcium boro-gluconate" as a therapeutic product. Two to 2½ ounces of this substance dissolved in 10 to 12 ounces of warm water forms a treatment ready for immediate administration.

The Nature of Calcium Boro-Gluconate

When calcium gluconate is dissolved in a solution of boric acid, we have reason to believe that a new chemical compound is formed, for which, in the absence of precise information regarding its structure, we suggest the name "calcium boro-gluconate." We have found that when the calcium boro-gluconate solution is evaporated to dryness, the residue obtained differs from either of its components both in its appearance and in its physico-chemical properties. It also differs in these respects from the product resulting from the mechanical mixture of the two. Calcium gluconate is a fine, white crystalline substance which, when subjected to strong heat, swells up to about twenty times its volume while charring. On the other hand, calcium boro-gluconate consists of coarser crystals readily exhibiting cleavage on mechanical pressure. On heating it decrepitates strongly and exhibits only a moderate degree of swelling while charring. Further, the identity of the boric acid seems to be lost when tested for by the flame reaction. When the compound, either in the form of the crystals or in a finely powered condition is ignited, no trace of green coloration can be detected in the flame; whereas, a finely triturated mechanical mixture of boric acid and calcium gluconate, when treated in the same way, gives the characteristic green color of free boric acid.

Calcium gluconate is soluble in water 1 in 30 at 15°C., and 1 in 5 at 100°. The boro-gluconate shows a solubility in water at 1 in 1 at 15°C., and 2.8 in 1 at 100°C. The reaction of the gluconate solution is pH 6.0, whereas that of the boro-gluconate is pH 3.7.

Comparative Merits of the Intravenous and the Subcutaneous Routes of Administration

By injecting calcium compounds directly into the circulation, a rapid—frequently a spectacular—curative response is elicited; indeed, the conversion within a few minutes of a deeply comatose animal into one which presents the appearance of normality constitutes perhaps one of the most striking examples of specific chemotherapy in comparative medicine.

The intravenous method of injection has, however, these disadvantages:

1. It can be applied only with great difficulty in cases characterized by marked excitement and incoordinate movement.

2. It involves the sudden introduction of

large quantities of calcium into the blood, and this steep gradient of increase in the blood calcium concentration activates the excretory organs to effect its rapid removal, with resultant symptoms of relapse.

3. The intravenous injection of calcium salts is attended by the risk of heart block. This unfortunate complication has been, on several occasions, reported by Continental veterinarians when using intravenous injections of calcium chloride, but the occurrence of heart block has not yet been recorded by British practitioners, by whom, however, the gluconate is much more commonly employed.

4. Calcium chloride, being very caustic, cannot be used subcutaneously, but, because its cost is very low, it is commonly employed for intravenous administration; its injection, however, must be very perfectly performed; otherwise, because of its caustic action, extensive necrosis results at the site of injection. Indeed, it is now apparent that the use of calcium chloride should be entirely abandoned in practice. The practicability of the employment of calcium lactate is now under investigation.

Subcutaneous injection appears to be distinctly the preferable method of administration; it possesses the following advantages:

1. Experience indicates that the subcutaneous injection of calcium boro-gluconate is entirely unattended by the occurrence of untoward reactions either systemic or local in character.

2. Subcutaneous injections can be administered readily, even in cases characterized by marked excitement.

3. The calcium solution being absorbed more slowly into the circulating blood, the curative response is, therefore, more steady in its development, while the risk of relapse, even when the udder is milked "dry," appears to be no greater than that which attends mammary inflation.

Advantages of Calcium Therapy over Mammary Inflation

Calcium therapy possesses definite advantages over mammary inflation in that:

1. It obviates the necessity for interference with the functionary mammary gland which, at the initiation of lactation, is actively engorged with blood, and is exhibiting marked activity in effecting the changes in the blood components necessary to produce the colostrum in the gland aciri. Distension of the udder, such as is induced artificially by mammary inflation, suppresses and deranges mammary function during its most delicate and critical phase.

2. The performance of mammary inflation under completely aseptic conditions is not always possible in practice, and the occasional sequel of septic mastitis, while of comparatively rare occurrence, is a very serious one.

3. The treatment can be applied easily and very quickly.

4. The parenteral injection of calcium salts can be performed only by the veterinary practitioner, and the injurious effects which may follow attempts to effect mammary distension by the lay attendant are thus obviated.

5. The treatment is eminently rational in its conception and practice.

Prevention of Milk Fever by Calcium Therapy

In those highly susceptible cases in which milk fever makes its appearance at several successive parturitions, it has been found that the attack can be effectively prevented by the injection of one to two ounces of calcium boro-gluconate immediately after calving and, preferably, repeated after an interval of 20 hours.

Calcium Therapy in Conditions of Hypocalcemia Other Than Milk Fever

The parenteral injection of a solution of calcium boro-gluconate can be applied also with specific curative effect in those conditions other than milk fever which are known to be due to acute hypocalcemia, i. e., lambing sickness, transit tetany in the mare and sheep, and the parturient eclampsias of the sow and bitch. Certain forms of "staggers" in feeder cattle may yet be found to be associated with acute hypocalcemia, since their treatment by calcium therapy is also followed by prompt and complete recovery.

Summary

1. A specific curative treatment for milk fever and its allied conditions, which is at once safe, reliable and rational, has now been evolved.

2. The treatment consists in the parenteral injection of a solution of "calcium borogluconate."

3. Certain physico-chemical characters of this substance are discussed.

4. Reference is made to a specific method of prophylactic treatment for milk fever in cows.

Acknowledgments

The authors clearly appreciate, and readily accede to, the suggestion of Professor Oluf Bang that this paper should first receive publication in the Danish language; the work of Jürgens Schmidt of Kölding in demonstrating the curative effect of mammary inflation not only revolutionized the treatment of milk fever and markedly reduced its economic importance in the dairying industry but provided the major clue through which the immediate cause of the disease was eventually disclosed.

To those of our collaborators whose help and encouragement were with us in the difficult early days of our research, we would again acknowledge our gratitude. Among these we are especially indebted to Mr. T. le Q. Blampied, St. Helier, Mr. E. C. Bovett, Bristol, Mr. William Hepburn, Aberdeen, Mr. Oscar Stinson, Appleby, and Mr. James Younger, Dumfries.

Our colleague, Mr. D. R. Wilson, determined the comparative antiseptic properties of calcium boro-gluconate and calcium gluconate.

* * * *

Loss of Sows From Mastitis

A condition in swine of interest was investigated.

History.—Forty pure-bred, spotted Poland China sows were bred to farrow in March. Thirty were two-year-olds and ten were gilts about one year of age. These sows were fed a small amount of corn with a little tankage and had access to chopped, sheaf-oat hay during the winter. They were not fat but in fair condition. They were being kept in a small blue grass pasture, in which there was little grass, and were provided with an ample quantity of good water. About six weeks prior to farrowing, the corn ration was increased. Five of the older sows had farrowed, without difficulty, from 6 to 10 apparently normal, thrifty pigs. Two of the sows that had farrowed died, one on the third, the other on the fourth day after farrowing. The caretaker observed that the affected sows champed their teeth; "foamed" at the mouth and reeled when they walked. In a few hours after the first symptoms appeared, the sows went down and died within a few hours.

Lesions.—The second sow died about 20 minutes prior to the autopsy. The mammary glands were excessively tumefied and were quite hard and hot. On incision each mammae was found to be gorged with milk and blood. A complete autopsy was made, but the only abnormality found was congestion and inflammation of the mammary glands. The uterus was clean, there being no evidence of shreds or portions of the placenta.

Diagnosis.—Mammitis incident to improper feed and feeding. Some practitioners have designated this malady as parturient paresis or milk fever, and they may be correct. However, milk fever in cattle is usually more prevalent in cows that are milked relatively dry. These sows, or at least the one that was autopsied, had an abundance of milk in the udder; also, according to the caretaker, these sows did not become comatose.

Recommendations.—It was recommended that the diet for the sows prior to farrowing consist of ground oats, chopped alfalfa and a small amount of tankage. When the sows farrowed they were to be provided with water only for from one to two days, unless the sow became quite restless, when they should be given ground oats or a bran mash; the amount of grain feed to be limited until ten days after farrowing. The grain feed should be increased to a full ration by the 15th or 20th day.—A. T. K.

Trichomonad Disease of Cattle

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IN CATTLE a number of specific infections are recognized as causing breeding troubles. These include a protozoan infection that has long been regarded by many invetigators with suspicion and by others with certainty as regards its pathogenicity. This protozoon is a trichomonad for which Riedmuller has suggested the name *Trichomonas bovis*. Evidence accumulated since it was first reported by Mazzanti (1900), and by Emmerson (1932), in this country, tends to indicate that it is pathogenic and that once established in a herd, it leads to much trouble in breeding, including pyometra, endometritis, vaginitis and abortion.

Morphology.—The trichomonad is slightly larger than a leucocyte and smaller than an epithelial cell found in a vaginal smear. Trichomonads assume many shapes and forms, ranging from pyriform to fusiform or roundish. The average size is 16x16.5 microns. Three flagella are usually observed protruding from the anterior (and or) blephoroplast. These flagella are as long if not slightly longer than the body. Originating from or near the blephoroplast is seen the undulating membrane. This membrane extends the entire length of the body and when the form of the body is changed from pyriform to fusiform, it becomes longer than the body. A trailing flagellum is noted incorporated in the attached border of the undulating membrane which extends beyond its posterior end. The neucleus is large and usually located in the anterior portion of the cell. The motility of the organism seems to vary. The flagella are seen to be extended in front of the cell and then vigorously lashed back against the side of the body. Then a forward movement is manifested. Some of the microörganisms move with a special motion of the body, the flagella being seen first on one side and then on the other. The undulating membrane seems to be in a constant state of agitation and results in a jerky progress along an irregular path. The mouth marks the ventral side of the animal, but is usually not visible. When open, the mouth appears as a triangular opening.

Symptoms.—Very little, in the way of external symptoms, is manifested by an animal with trichomonad disease. Often one observes a collection of dried mucus and manure on the tail and vulvar hairs. When an affected animal lies down, one will usually see a mucopurulent material exuding from the vulva. This mucopurulent discharge is peculiar to trichomonad disease. It is made up of a clear or slightly cloudy mucus, incorporated in which are clumps of a cream-colored pus. When the pus is examined microscopically, trichomonads are usually found. When an animal is in heat, these clumps of pus may not manifest themselves, but the mucus discharges will appear cloudy and somewhat watery. There is no distinguishable odor to the discharge.

If a cow has remained standing for some time prior to examination with the vaginal speculum, one will usually observe a collection of mucus or mucopurulent material on the floor of the vaginal anterior to the posterior sphincter and just below the cervix. Occasionally one will see the mucopurulent material being exuded from the cervix. Small ecchymotic hemorrhages have been observed on the cervix and anterior portion of the vaginal wall.

Abelein has described an epidemic of abortion accompanied by catarrh of the uterus, cervic and vagina. Nodule formation in the vagina was a characteristic lesion. The diseased cattle showed an infestation of the genital tract with trichomonads in such numers that they appeared to be the cause of the condition. This nodular thickening of the anterior portion of the vagina, ranging from papillary eruption to extensive thickening, has been observed by other investigators. Early abortions are designated by Abelein as those which occur within four and a half months after conception. In most cases of

early abortions the trichomonads were found in the fetal fluids and in the fetus. After 2½ years of study he found trichomonads only in cows which had been served by trichomonad-diseased bulls. The protozoa were not found in any case of post-parturient pyometra. Trichomonads were most abundant in bulls with profuse preputial catarrh.

Abelein has observed that when trichomonad disease invades a herd which has been free from Bang's disease and sterility, it at once reveals its presence chiefly by epizootic abortions. Spontaneous recovery tends to occur and sometimes a cow is again in heat within two or three days *post abortum,* may conceive and gestation pursue a normal course; in this regard it is in sharp contrast to abortion caused by Bang's disease.

Estrum seems to be disturbed in animals showing trichomonads, in that it occurs irregularly or the diestrual period is greatly prolonged. Virulence rises and falls with variations in the visible preputial catarrh of the bull. If the preputial discharge is abundant, although perhaps due to the presence of bacteria, the trichomonads become more abundant and the bull increasingly dangerous. Increase of the sexual load depresses the vigor of the spermatozoa or intensifies the trichomonad infection, or both.

Transmissibility.—Most investigators of trichomonad disease believe that the infected bull is the means of infecting healthy females, but should the intestinal species of trichomonas prove to be identical with that found in the genital tract, then this theory would have to be modified.

Numerous experiments have proved that trichomonad disease can be transmitted artificially by depositing secretions containing trichomonads in the vagina of a normal cow. The vaginitis produced is usually of short duration—about 30 days. At Iowa State College, Walsh and his coworkers have been able to produce abortion in guinea pigs, rabbits and in one heifer when the protozoa were introduced into the pregnant uterus.

Diagnosis.—This is usually made by a direct examination of exudates or discharges under the microscope, with or without the aid of the dark field. Immediate examination of the discharges from the vagina has often shown no protozoa present, but examination of such material after 12 to 18 hours incubation at about 37°C., makes trichomonads easily demonstrated. This may suggest that on incubation there is multiplication. For diagnosing trichomonads in bulls, the technique consists of swabbing the prepuce with absorbent cotton and then immersing the cotton in 0.5 per cent Loeffler's dehydrated blood serum in a 0.75 per cent aqueous sodium chloride solution. This is incubated at 37°C. and an examination made after 12 hours.

Stained preparations are of little use. Evidently the protozoa are so fragile they break during fixing and drying. Best results are obtained when moderately thins smears are made from rather fluid discharges.

Treatment.—In the New York State Veterinary College, disinfection of the uterus of infected cows with one half to two liters of three per cent warm aqueous Zonite, followed immediately by the same amount of 3 per cent Lugol's, solution has produced good results. Other cases were followed by daily vaginal douches. In some cases uterine douches were repeated at from five to ten-day intervals. Following this treatment, the protozoa disappeared from the vaginal mucus rather promptly in the majority of cows and heifers. In three cases, however, vaginal and uterine disinfection was required for a period of four months. It is possible that the organism will disappear from the genital tract of females following sexual rest alone. Since there is no proof that an infected bull will ever become a safe breeder his removal from service indfinitely is apparently an important step in controlling the infection.

Of the various drugs used in the treatment, Chinosol in a dilution of 1:1500 has given good results, and on account of its non-irritability is to be preferred to others. For a successful combat of trichomonad infection, besides treating the infected individual, one must adopt necessary preventive measures for uninfected members of the herd.

Thus trichomonad disease is a specific in-

fection of the genital tract of cattle, caused by *Trichomonas bovis*. This organism has been found in heifers and cows suffering from sterility, metritis and abortion, and must be seriously considered as a pathogen that has not previously been diagnosed as causing breeding troubles. To eliminate this infection from a herd, the infected bull must be taken out of service, and disinfection of the vagina and uterus combined with sexual rest practiced.

Light Sensitization in Herbivorous Animals

Light sensitization is characterized by more or less severe inflammation of certain portions of the skin, especially the white parts, accompanied by irritation, exudation, and necrosis. It is usually, perhaps always, the result of a combined effect of the ingestion of one of several plants and direct sunlight.

For a good many years a condition affecting domestic herbivora has existed in New South Wales, known as aphis disease. It is given the name because stock-owners hold the opinion that it is caused by aphids, which are very prevalent in the spring. It also occurs when trefoil is green and abundant. The stock-owners, however, consider trefoil as only a carrier because it is a favorite haunt of aphids. Since the same disease is seen often after eating trefoil, it is also called trefoil dermatitis. The disease occurs mainly during August, September and October, the months of spring in New South Wales.

Frequently at this season large numbers of sheep are affected after shearing, mainly in the region of the back. The nose and ears are also the seat of lesions. In the latter case it is chiefly young sheep that are affected. In horses and cattle it affects unpigmented skin, that is, the white parts, pigmented parts remaining unaffected. In sheep it also affects only unpigmented areas.

A condition presenting lesions similar to trefoil dermatitis, but resulting from the ingestion of buckwheat and subsequent exposure to sunlight upon unpigmented skin, is fagopyrismus; in which the lesions appear mostly upon the face, ears, nose and throat.

The degree of cutaneous reaction is said to depend on the intensity of the sun's rays and the amount of buckwheat ingested. The eating of the green plant is the most active cause, but the disease may follow the ingestion of the grain, straw, chaff, and bran also.

Animals with no unpigmented areas of skin are not unaffected by fagopyrismus, nor are those in which the unpigmented parts of the skin are blackened over. Animals in which the unpigmented parts are covered by dirt or dust are less severely affected. Furthermore, no cutaneous reactions develop even in white animals in cloudy weather, nor in animals protected from direst sunlight.

In buckwheat exanthema, exposure to sunlight need not immediately follow feeding on buckwheat. It may occur three or four weeks after plentiful feeding on the plant.

According to Doctor Udall, it has been found that certain pigments in the blood, especially hematoporphyrin (iron free hematin) and artificial fluorescent substances, sensitize living cells to light. Another suspected cause is fungi in the buckwheat which comes in contact with the skin and injures its unpigmented parts, either directly or by toxins.

It is also believed that toxins injure the vaso-motor nerves, under the influence of the chemical rays of the sun in areas in which such influence is not prevented by pigmentation.

On the continent of Europe and in the United States, a disease called clover disease; or trifoliosis, presents lesions similar to trefoil dermatitis and fagopyrismus. This condition has been noted especially in horses after generous or exclusive feeding on Swedish clover, and also on red clover. It has also been observed in cattle and sheep after pasturing on clover meadows or feeding on red clover. It occurs also in young white or white spotted pigs, running in clover. In pigs it may be due to contact, since it is seen in sucklings.

The cause of trifoliosis is unknown. One view is that it is due to the ingestion of fungi with the clover, and another that clover produces a somewhat similar effect upon the body to that caused by buckwheat.

Bighead in sheep, a disease of range sheep in the Rocky Mountain region in the spring and early summer, appears to be closely allied to light sensitization, although there is some evidence that it is simply a plant poisoning. It occurs before shearing when there is a sudden change of weather from cold to extreme heat; most commonly when the sheep are driven in hot sun after a cool night. In a band in Montana, observed by Welch, transient paralysis followed by bighead and superficial necrosis on the back occurred in sheep turned out in the sun after shearing. Clawson found reason to suspect two range plant of responsibility for bighead, coal oil weed (*Tetradymia glaubrata*) and spineless horse brush (*T. canescens* var. *inermis*).

There is some evidence that iodism in cattle may be due to a combination of iodine and exposure to light; in this case to either direct or diffused sunlight.

The lesions presented in light sensitization are almost the same, irrespective of the cause. The parts affected appear to be invariably cutaneous. The lesions are confined to the unpigmented portions of the skin. In sheep, if the unpigmented portions of the skin are protected from the sun by wool, dirt, or dust, it remains normal. The same has been observed in horses and cattle when the umpigmented areas are covered with black substances, whether medicated or not.

In sheep the common sites of the lesions are on the back, ears, nostrils and around the mouth. In horses, the main sites of lesions are the nose and lower parts of the extremities. In cows the udder and teats are often affected. Lesions may and do occur, however, in any situation where the skin is unpigmented, uncovered and exposed to the sun's rays. As a rule, the lesions appear on the sheep's back shortly after being shorn. The first thing noticed is a marked reddening and if the hand is run over the back, the affected skin feels markedly swollen. Later there is an exudation which coagulates and forms crusts or scabs. These may fall off and leave raw flesh. The more usual course is inflammatory edema and considerable itching of the affected parts. This causes the animal to bite, rub, or scratch the part, in consequence of which the lesions may become more extensive and serious. These lesions occur mainly in New South Wales in aphis disease.

In bighead, which is observed more frequently in sheep in the United States than trefoil dermatitis, the lesions are characterized by sudden swelling of the head and ears, and th presence in the swelled portions of a straw-colored serum which often drips from the part. The affected tissues present a gelatinous appearance and the swelling is often so severe that the animal's vision is partially or entirely obscured. This, with severe irritation of the head, causes the sheep to be extremely restless and to walk aimlessly about until exhausted. Often a transient paralysis precedes bighead and skin necrosis.

The lesions as they appear in horses or cattle are the same regardless of the type of feed. In mild cases there is an intense erythema, accompanied by slight swelling, hypersensitiveness and itching of the affected parts. In severe cases there is an intense edematous inflammation with vesiculation and exudation of a sticky fluid, followed by matting of the hair and scab formation. Fröhner cites a case in which there was icterus, stomatitis and severe disturbances of consciousness, with paresis.

Summary: Light sensitization occurs in sheep, cattle and horses. It is primarily a dermatitis of the unpigmented skin caused by direct action of the sun's rays on herbivorous animals that have eaten certain plant foods. Treatment consists chiefly in change of feed or pasture and applying a soothing protective dressing, such as zinc oxide to the affected parts. To prevent bighead, do not drive the sheep in extremely hot weather or allow them in the sun immediately after shearing.

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A Study of Bovine Coccidiosis

Bovine coccidiosis has become so widespread and destructive, that it is now a serious malady in the cattle industry and warrants careful consideration on the part of every veterinarian. Is there anything that the practitioner can do to help control this situation? Yes, instruct cattle owners as to the nature and type of the disease, what to do when it appears, and in control problems.

Definition:—The definition of coccidiosis given by Udall in his text-book "The Practice of Veterinary Medicine" states that it is: "A specific hemorrhagic enteritis affecting the rectum, to some extent the colon and cecum, caused by coccidia, and manifested clinically by the passage of thin feces usually containing fresh clots of blood[1]."

Prevalence:—The disease has been described only a few times in the United States, but it occurs from coast to coast. European writers have frequently described this disease. It is common is Switzerland, France, Northern Germany, Denmark and England. *Eimeria zurnii* is the species of coccidium affecting cattle.

Etiology:—Coccidiosis is caused by ingestion of oocysts, immature forms of *Eimeria zurnii*. This cyst-like form reaches the ground in the droppings, and contaminates the food and perhaps the water consumed by cattle.

Life History:—The adult parasites are protozoa, living in the epithelial cells of the mucous lining of the rectum. Immature forms, oocysts, pass out with the feces. These become infective in a few days and are able to survive thus for several months. The oocysts are oval, or rounded and are from 15 to 25 microns in length and 10 to 20 microns in breadth. In the digestive tract of the animal, the oocyst wall is dissolved and the male and female elements therein liberated. These bore into the epithelial lining of the posterior portion of the digestive tract and there multiply, producing asexual forms. This causes injury to the mucosa and hemorrhage results. The asexual forms when liberated bore into new epithelial cells to multiply anew. Next, male and female forms are produced and unite to form the oocysts. The oocyst is then ready to pass out in the feces. Some believe that the coccidia oocyst requires an intermediate host. Amphibians have been suggested as possible intermediate hosts but, as yet, there is no conclusive evidence that coccidia have such a host.

Symptoms:—"Infection occurs chiefly in pastured young stock, and is most often observed in early spring and late fall, although it may occur at other seasons[1]." There are cases reported as occurring in stabled animals, but this is not common. The period of incubation varies, Degoix placing it as long as one or two months, although the average is about three weeks, and it has been reported to be as short as six to eight days. The disease is ushered in with diarrhea, which soon becomes bloody; anorexia and lessened milk flow are always present. If the attack is severe there is marked tenesmus which often leads to prolapse of the rectum. There is rapid loss of condition, and weakness and fever is commonly present. A falling temperature combined with a rising pulse is an unfavorable sign. In cases of long duration—a week or more, depression becomes marked, eyes sunken, and the animal no longer able to stand, dies from prostration. The average course is one to two weeks; severe attacks usually end fatally in three to four days. In young animals the motality may be 50 per cent or more. No immunity is conferred upon the survivors.

Lesions:—The cadaver is badly smeared with feces and emaciated. The mucosa of the rectum is reddened and thickened, ridged in thick, longitudinal folds and may be edematous. Such lesions are seen often in the colon, cecum and ileum. Hemorrhages may be found in the pericardium and pleura.

Treatment:—Affected animals should be isolated as promptly as possible and kept isolated until dead or until recovery has oc-

[1] Udall, D. H. "The Practice of Veterinary Medicine," 1933 edition, page 62.

curred. The contaminated litter should be burned or buried and the stalls scrubbed with a three to five per cent creolin solution. There is not much one can do in the form of medication, although some benefit may be derived from the administration of non-irritating laxatives. Mineral oil, for example, may be given in small doses once a day for three or four days following the onset of the attack. The use of mild astringent enemata appears to be of value in some cases. For this one may use one per cent alum, one per cent tannic acid, or weak iron salt solution. Formalin and creolin aid in checking intestinal fermentation. In some cases supportive treatment may be of value.

In general, coccidiosis will run its course and treatment is of questionable value. It is always well to warn dairymen to be careful, when buying herd additions, not to purchase animals from herds where coccidiosis has been known to exist. Carriers are not uncommon in herds where there has been an outbreak. Carriers show no clinical symptoms and can be detected only by examining the feces microscopically.

The microscopic examination is made by centrifuging some of the suspected fecal matter; filling the centrifuge tube one-third full of feces and then filling the remainder with a supersaturated solution of sugar or sodium chloride and mixing thoroughly. Centrifuge for five to eight minutes. If coccidia oocysts are present, they will be floated and may be obtained for examination by touching a glass slide to the surface of the liquid. Examine under low power magnification. If coccidia oocysts are present, they will appear as oval or round, thick-walled bodies, having two or four granular inclusions. With very little practice this procedure may be accomplished easily and quickly.

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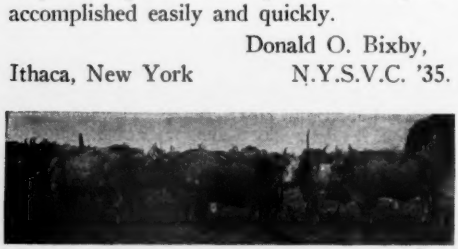

Navicular Disease in Horses

Scientific literature on navicular disease in horses barely touches upon the history of this common and serious lameness. One is reasonably safe, however, in asserting that this disease has been important in this country since the middle of the eighteenth century, when the horse began to be used extensively for work and as a means of transportation.

Navicular disease may be defined as an inflammation of the sesamoid sheath, induced by repeated bruising or laceration, and complicated in many cases by inflammation and caries of the navicular bone. In some instances the disease undoubtedly begins in the bone, and the sesamoid sheath becomes involved subsequently by an extension of the inflammatory process. There is no definite seasonal occurrence for this disease. Thoroughbred running horses and standardbred harness horses are more commonly affected because of the nature of their work.

No class or breed of horse is entirely exempt from navicular disease. Mules rarely suffer from it. Because there is considerably less pounding with the hind feet than with the front feet, the former are not so liable to be affected. The disease usually affects the fore feet, one at a time; the trouble commonly becoming chronic in the first foot attacked before the second shows signs of the disease.

To understand how navicular disease may be caused by conditions and usages common to all horses, it is necessary to recall the peculiar anatomy of the parts involved and the way they function. The navicular bone is an accessory or sesamoid bone to the os pedis or third phalanx. It is small, transversely elongated and situated behind and below the os pedis. It adds to the articular surface of the pedal joint. Its under surface is smooth, furnishing a gliding surface for the perforans tendon (deep flexor) which is quite wide at this point. Between the navicular bone and the perforans tendon there is a bursa known as the podotrochlearis or navicular bursa. It must be remembered

that the fore legs support the weight of the major portion of the body when the animal is at rest, and the faster the animal moves the greater is the shock which the fore feet receive as they strike the ground. This shock is largely dispersed by the elastic muscles which bind the shoulder to the body, the ease with which the arm closes on the shoulder blade, and spring of the fetlock joints. These alone are not sufficient to protect the foot from injury. Nature has further aided by placing the coffin joint on the hind part of the coffin bone, instead of directly on top of it, whereby a large part of the shock of locomotion is dispersed before it can reach the vertical column represented by the cannon, knee and arm bones. Another provision of nature to absorb the shock is the soft elastic frog and plantar cushion at the heels, which receive the sesamoid expansion of the flexor tendon as it is forced downward by the pressure of the coronet bone against the navicular bone. Thorough as is the protection thus afforded, it fails to relieve the parts completely from concussion. The result is that the coronet bone forces the navicular bone against the deep flexor tendon, which, in turn, presses firmly against the navicular bone as the force of the contracting muscles lifts the tendon into place. It is thus evident that the faster the pace and the greater the load, the greater must these contending forces be, and the greater is the liability of the navicular bone to injury.

Many authorities are of the opinion that the most common, indirect, causes of navicular disease are raising the frog from the ground and the resulting contraction of the hoof. An old author of high standing says: "When the foot is in its natural condition, the frog is its strong point of support; and if the support is removed by paring, or by the use of thick-heeled shoes, which raise the frog from all possible contact with the ground, the support is weakened and there is necessarily great strain thrown upon the tendon. This is caused by pushing the coronary against the navicular bone, which, being repeated at every step or jump the horse takes, strains the tendons, or causes inflammation."

Contraction of the hoof may result from too little exercise; from errors in shoeing, such as weakening the posterior half of the foot, leaving too long a toe, either neglecting to remove the spurs of horn which grow from the buttresses and press upon the frog, or removing them completely; using shoes whose branches are either too wide apart or are inclined downward and inward, so that under the weight of the body the heels are squeezed together and contraction is favored; and from inflammation of the sensitive laminae.

Navicular disease may also be due to the lack of certain elements in the diet, such as calcium and phosphorus, or a lack of proper assimilation of these ingredients or of their proper balance in the diet. Any roughening on the posterior surface of the navicular bone will irritate the sensitive laminae of the walls of the foot. Any roughening on the anterior surface of the navicular bone will irritate the joint. Severe bruises and straining of the coffin joint may also cause acute navicular disease with lameness.

The chief symptom of this disease is lameness. A horse may not show any lameness at a walk, but when the gait is increased, lameness will become apparent. Pointing of a fore foot may be a symptom of navicular disease, but it must be remembered that pointing is also a symptom of other foot and leg diseases in the horse. A horse with navicular disease will step short in order to ease the pressure on the navicular bone. He has a "stubby" gait, thus wearing off the toe calks. As a result of the changed gait which the horse adopts to ease the pressure on the navicular bone, his chest muscles atrophy (chest founder). As previously mentioned, the heels contract; the more they contract, the more severe becomes the lameness.

In the clinic of the New York State Veterinary College at Cornell University, the following methods are used in examination for navicular lameness:

1. Increase the pressure on the navicular

bone and the deep flexor tendon by placing the affected foot on a plank and picking up the front end of the plank.

2. Extend the toe as far as possible; push thumb down into the heel; then with the thumb held firmly in place, flex and extend the toe several times and note any pain evidenced by the patient.

3. Apply pressure with a hoof tester over the ends of the navicular bone. This is particularly effective in picking up navicular trouble at the ends of the bone.

The prognosis for the disease is not too good. If due to contracted feet and the condition is corrected early, a cure may be obtained. As a general rule in few cases of navicular disease is recovery permanent. For the present day treatment of the disease, I shall quote J. N. Frost of Cornell University. He said:

"For about five years, in navicular disease, we have been giving treatment to increase the intake of calcium and treating the condition locally by injecting navicular bursae. Formerly we used an ounce of Lugol's solution and glycerine, but more recently we have been using an injection of calcium glycerophosphate, seven and one-half grains to an ounce of water. The foot should be anesthetized. The best anesthetic to use for this purpose is quinine and urea hydrochloride. This should be injected over the plantar nerves. The anesthesia lasts about four days, and in this time the pain in the bursa will have disappeared.

"It is well to shoe these animals to give them a roller motion in breaking over the toe. A bar on the shoe is also advantageous, but the ordinary bar shoe, the bar of which projects forward and brings pressure directly over the navicular bone, should not be used. A good way to prepare a shoe for this condition is to hammer out the heels somewhat thin, curve them inward until they touch and put the shoe on with the original front to the rear, to be used as a plate. What was originally the toe of the shoe then becomes what we call the posterior bar and can be fitted to bring frog pressure well behind the navicular joint. It pays to keep the navicular foot soft. If the heels are contracted, as they usually are, the walls should be thinned until they give readily under pressure of the thumb. They should be thinned on the inside also. Then a mixture of crankcase oil, oil of turpentine and tar can be painted on the foot and over the coronet two or three times a week. This application is just irritant enough to cause a rapid growth of hoof and keeps the hoof from drying out and getting hard. When it grows down again, it will be noted to be from three-fourths of an inch to an inch wider at the heel than formerly. The animal should be permitted to exercise."

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Acetonemia in Cows

ACETONEMIA is known by various names; chronic milk fever, atypical milk fever, gastro-intestinal catarrh after calving, ketosis, ketonuria, ketonemia, aceturia, acetonuria and acidosis. It was first observed by Jansen in Germany, in 1908. For a time little attention was paid to Jansen's pronouncement. In recent years it has sprung into prominence and, at the present time, is considered a highly important malady of dairy cattle.

Its close association with milk fever is of great importance. Like milk fever it is seen chiefly in well-kept dairy cattle, on a heavy concentrate diet. The attack usually appears about 8 to 10 days after calving, but may occur weeks later and before parturition as well.

The primary cause is not definitely known, although several investigators attribute it to a deranged carbohydrate metabolism, to a degree where there is diminished fat oxidation. The result is an increased production of such ketone bodies as acetoacetic acid, beta-hydroxybutyric acid and acetone.

An important feature of the study of acetonemia has been the analysis of blood and urine. The normal urine of a cow has an acetone content of about 7mg per 100cc. According to Hayden and Sampson when the acetone content reaches from 15 to 20mg per 100cc a condition of ketosis is present.

In some cases the acetone content has gone as high as 1250mg per 100cc of urine.

The difficulty in the diagnosis of acetonemia is owing to its close resemblance to milk fever and its frequent complication with that and other ailments—metritis, indigestion, etc. If a patient does not respond promptly to udder inflation or calcium gluconate administration, suspect acetonemia.

The original diagnosis was based on the Rothera test for acetone bodies. This consisted of obtaining 5cc of urine in a test tube and adding a little ammonium sulphate, two to three drops of freshly prepared 5 per cent solution of nitroprusside, and 1 to 2cc of a concentrated ammonium hydroxide. The development of a permanganate color indicates acetone bodies. The sodium nitroprusside solution is very unstable lasting only about a week which made it inconvenient for use. A modification of the Rothera test, known as the Ross test, is now used. It consists of combining the sodium nitroprusside and ammonium sulphate in the dry crystalline form, one part of the former, powdered, mixed with one hundred parts of the latter. This may be kept indefinitely.

The test for acetone by this method consists in adding to 5cc of suspected urine one gram of the nitroprusside sulphate mixture and 2cc of ammonium hydroxide and shaking this in a test tube. If acetone bodies are present a permanganate color will appear after a minute or two and become more marked with the intensity of the acetone bodies.

The best results in the treatment of acetonemia have been obtained by the use of dextrose. An intravenous injection of 50-250mg of a 25 per cent to 50 per cent solution is usually given. Feeding molasses to the affected animals is also recommended. The oral administration of chloral hydrate, two to four six-dram doses at intervals of six hours is effective in overcoming attacks of acetonemia. It is well to keep the digestive tract stimulated or to give a mild purge. The condition is prone to recur.

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Sweet Clover Disease in Cattle

AMONG many agricultural communities in North America a noxious weed—sweet clover—has become recognized as a farm crop of great value. In areas where the cultivation of corn for ensilage has been threatened by the corn-borer, sweet clover has become the popular substitute. It is both chemically and physically beneficial to the soil, and is far more economical and convenient to handle than corn. Rumors in 1922 that this ensilage was responsible for many deaths in cattle in widely separated districts led to an immediate investigation. Schofield, in the Canadian *Veterinary Record*, was the first to report these losses. Preliminary observations were made in his laboratory during the winter of 1921-22. In May, 1922, the first opportunity to study the disease occurred when two clinical cases were seen and four necropsies were performed.

Animals, apparently healthy, were reported to be dying within a few hours after the operations of dehorning and castration as well as shortly after calving. The disease, called at first, sweet clover poisoning, but later more appropriately, sweet clover disease, has been reported in sheep also but is not common. In the horse, it is so rare as to constitute a veterinary curiosity.

There is no other feed known to produce the profound changes seen in sweet clover poisoning. It is characterized by the loss of the clotting property of the blood. After being fed on certain sweet clover hays ten days to three weeks it has been noted that the blood of yearling cattle clots more slowly than normal. In about four weeks it fails completely in this phenomenon. This is a dangerous situation of which the farmer is not aware, for there are no visible external symptoms in this stage. Prominent swellings due to hemorrhage appear later, however. The affected animal's appetite and appearance are quite normal and gains are fair.

The animals stand in a stiffened attitude

are lame and move with a stiff, jerky gait. The swellings may occur anywhere but are more often seen over the quarters and along the back and neck regions than elsewhere. They are due to hemorrhages which vary in size from mere spots to large sheets or masses which include large areas, some reaching a thickness of several inches. The loss of blood calls upon the heart for greater effort, resulting at times in a fourfold increased frequency and audible heart sounds several feet from the animal. If 5cc to 8cc of blood are drawn into a 16mm tube, the clotting time may be determined by noting the interval elapsing before the blood will remain in the tube when inverted. The blood of cattle ordinarily clots within ten to twenty-five minutes.

On autopsy after removal of the skin of an animal dead of sweet clover disease, one is impressed by the pale bloodless appearance of the internal organs and muscles. The liver, spleen and kidneys are usually free from noticeable hemorrhages. Voluminous masses of blood may be found wedged between muscles, particularly in the heavily muscled parts.

Sweet clover disease must be differentiated from blackleg. In blackleg the swellings are simply gas pockets which crepitate on palpation; whereas in sweet clover disease there is an absence of gas, and instead, a half-liquid to a solid tumor-like mass occurs. This is composed entirely of blood.

What causes this strange disease? Is it a specific poisonous principle of the plant? Pammel[1] discusses the etiology but gives no proofs—only suggests a poison; and states that the most reasonable conclusion is that the plant cannot be considered poisonous. Others suggest that this poisoning (?) causes an afebrile disease and so cannot be a type of septicemia. Still others maintain it is caused by substances formed within the feed by organisms, probably molds.

The evidence presented is against the assumption that sweet clover disease is a deficiency of some essential food element. F. W. Schofield[2] states that the available evidence points to toxic chemical substances developed and elaborated by the activity of microorganisms growing in the clover.

With our limited knowledge of the intricate mechanism of clotting it is often impossible to determine the reason for the delay in this complicated phenomenon. Medical literature does not present a parallel.

Workers asked, "What is this curious and interesting unknown 'X' that brings about such a remarkable state?" The answer at this time must be purely speculative; yet it can be reasonable. Such massive hemorrhage must no doubt result from a rent in the injured wall of the capillaries and small arterioles. A poison capable of destroying all the cells of a liver lobule will certainly do much damage to the delicate layer of capillary endothelium. Roderick[3] found that the progressive delay in the coagulating time of the blood might be explained by the decrease in its prothrombin content and hinted at a chemical entity which injures the endothelium of the capillaries and small arterioles.

Preventive measures are based upon the belief that sweet clover disease is due to poisons produced by the growth of molds and possibly other microorganisms in the clover. It is therefore of great importance to determine how best to prevent these growths. In wet seasons the hay is almost sure to be moldy. The seeds should be scarified in order that they will germinate more profusely; and, too, should be heavily sown. This insures a heavy stand and the stalks will be thin. (Molds develop most readily on tough, woody stalks.) Crops should be cut early—when in bloom; and of greatest importance, the hay should be well protected from moisture. If there is any evidence of molds, the hay should be fed sparingly and only to mature animals.

In treating animals a change of feed is imperative. It was discovered that the intravenous injection of the defibrinated blood of a normal bovine which had not been fed on damaged clover is highly successful in stopping the hemorrhage. On March 5, 1925, at the North Dakota Agricultural Experiment Station, 750cc of this blood was transfused

into an affected cow and prompt recovery followed. Today the treatment, except for an increase in dosage to 1,000 to 1,500cc, remains unchanged. In actual practice the blood which has been previously tested for coagulability should be taken from animals located on other farms where there is assurance that the damaged feed has not been used. Defibrination is accomplished either by shaking or stirring. The whole is then filtered through gauze.

An interesting feature of the experimental work was the observation that recovery following hemorrhage seemed to confer neither immunity nor increased susceptibility to hemorrhage in subsequent feeding experiments.

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The Early History of Veterinary Medicine

The practice of veterinary medicine is an art older than civilization. From the dawn of civilization, man has been an agriculturist—a live stock producer. The advance of veterinary medicine has kept pace with progress in the live stock industry and rendered it an invaluable service of protection.

The earliest reference to any veterinary practices, according to Major General Sir Frederick Smith,[1] is found in the Assyrian Code of Hammurabi, two thousand years before the Christian era. These laws indicate that there was at that time a regulatory system over animal breeding and treatment of animal diseases, including laws governing the fees for the treatment of sick animals. "If a doctor of oxen and asses has treated either ox or ass for a severe wound, and cured it, the owner of the ox or ass shall give to the doctor one-sixth of a shekel for his fee. If he has treated an ass or an ox for a severe wound and caused it to die, he shall give a quarter of its price to the owner of the ox or ass."

In 1889, there was unearthed in Egypt a papyrus on the diseases of animals. In this papyrus, several diseases are described, which were prevalent in ancient Egypt. One of the diseases appears to have been malignant catarrh in cattle; another discussion deals with sore eyes.

The next records of veterinary medicine come from Greece. Veterinary medicine flourished in this country for several hundred years, particularly in Bysantium or the Eastern Greek Empire; veterinary medicine became a science and was placed on the same level as human medicine and surgery. Anatomy was studied and the names given to many of the deeper structures of the body are still in use.

Simon of Athens, who lived about 430 B. C., was the most important contributor of the period. He wrote a treatise on the care and management of horses. He recognized the necessity for proper conformation in a good horse and the importance of good feet.

The famous Greek philosopher, Aristotle, in his celebrated book, "The History of Animals," noted many observations pertaining to veterinary medicine. He observed that the movements of the limbs of the horse were diagonal; that the horse had no gall bladder; that correct age could be determined by the teeth. In this book there is a wealth of information about anatomy, physiology and pathology of wild and domesticated animals. Aristotle described two diseases in cattle, foot-and-mouth disease and pleuropneumonia. Hippocrates appreciated the usefulness of comparative pathology in its application to human medicine. From his knowledge of the hydatid cysts in the brain of goats, he combatted the idea that human epilepsy was produced by demons.

Following the downfall of the Greeks, Rome became the center of civilization of the world. Agriculture was the most important field of human endeavor during the Roman Empire and consequently veterinary medicine was important.

[1]Smith, Major General Sir Fréderick, Early History of Veterinary Literature.

Columella, who lived during the first century, made many contributions to the knowledge of the diseases of animals, which are recorded in his "Husbandry," 62 diseases being described. He lays great stress on the necessity of segregation of the sick. He says: "The diseased must be separated from the sound, that not so much as one may come among them which may with the contagion infest the rest." This is the first time in the history of medicine that a reference is made to the isolation of the sick. It should be remembered that this was 1600 years before bacteria were discovered and still longer before it was known that they caused disease.

Vegetius who lived in the fifth century, was first to produce a work devoted entirely to veterinary medicine. He was a man of letters, a lover of animals, especially horses, deeply interested in veterinary science, and anxious to restore it to the position it had occupied in ancient Greece. He pleaded with the people to take care of their sick animals, if only for economic reasons. "As the curing of slaves is not considered vulgar, why should the curing of animals, which cost more to buy, be so?"

The sanitation, advocated by Vegetius in his treatment of contagious diseases, is surprising. He said that the healthy should be isolated from the affected, the dead should be deeply buried and the healthy should not even cross the ground where the dead were buried. All buildings and pastures occupied by the sick should be regarded as a source of contamination.

Many digestive disorders are described by Vegetius. Among these are obstruction of the stomach and intestines, acute tympany, twist, rupture of the intestines and colic. Examination per rectum was recommended as a method of diagnosis. Vegetius made a statement in the fifth century which is being appreciated in this modern age by both veterinarians and physicians. He said: "It is better by diligence and care to preserve health than to administer remedies when animals are sick."

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Infectious Bronchitis Vaccination

INFECTIOUS bronchitis (laryngotracheitis) is a specific, highly infectious disease of chickens and pheasants. It is caused by a filterable virus. Affected birds exhibit difficulty in breathing due to the collection of mucus, blood-stained mucus, or cheesy membranes in the windpipe. It often results in occlusion of the windpipe and suffocation of the affected bird. In some cases difficult breathing is not observed, but the eyes, nasal cavity, and sinuses contain mucus or cheesy material. Poultrymen frequently refer to such affections in their flocks as "roup," a term which conveys the nature of the general symptoms but does not specifically identify any one disease. Infectious bronchitis may exhibit anything from the pronounced symptoms commonly referred to as "roup" down to the conditions known as simple "colds."

In natural outbreaks of bronchitis, mortality is frequently high. The average mortality is at least 20% and may reach 50% or 60%. Egg production, during an outbreak in laying flocks, is lowered rapidly, and may not be resumed until several weeks after the peak of infection has been passed. The disease, therefore, is responsible for considerable economic loss through both mortality and lowered production.

Certain other diseases may be mistaken for infectious bronchitis. Infectious coryza, fowl pox, localized fowl cholera, streptococcus infection and vitamin A deficiency exhibit symptoms that resemble more or less, some types of bronchitis.

Survivors of an outbreak of this disease develop an immunity that extends throughout life. Evidence at hand indicates that the same lasting immunity is gained when birds are vaccinated.

Time for Vaccination.—In the case of emergency vaccination, the operation should be performed upon the definite establishment of a diagnosis of infectious bronchitis. The disease spreads rapidly when introduced into a susceptible flock and the effici-

ency or emergency vaccination depends upon the speed with which immunity is developed before natural infection takes place. Four to nine days are required to establish immunity after vaccination.

In the vaccination of growing birds, the operation may be performed at any time after the birds reach the age of six weeks. When birds of several ages are to be vaccinated it would be well to delay the operation until the youngest lot has reached six weeks of age. If, however, vaccinated birds can be isolated from non-vaccinated birds and separate caretakers can be provided, vaccination may be performed at different times. The vaccination of all susceptible birds at the same time is preferable.

Vaccinating the Chickens.—At least two persons will be necessary to facilitate the operation. More will increase the speed, but the beginner is advised to disregard speed and pay strict attention to proper application. Performing the operation early in the morning will add to the comfort of both birds and operator.

The operator should be seated comfortably near the catching crate. A stand for holding the block should be located within easy reach. The assistant should remove the bird from the catching crate and pass it to the seated operator, who places it between his legs with its head down and its back to his left. With the thumb and index finger of the left hand placed on either side of the vent the operator evaginates the upper lip of the vent to expose the mucous membrane. Then the vaccine is applied with a brush held in the right hand. In small birds the brush usually will have to be rotated while the bristles are against the membrane. In adult birds the bristles may be brushed across the membrane with a painting motion. Sweeping motions are to be avoided because droplets of vaccine may be flipped into the air. Contamination of the operator's fingers and the skin and feathers around the vent of the bird should be avoided.

Five days after vaccination, the birds should be examined for "takes," or to determine the success of the vaccination. In making this examination the bird is held as in vaccination and the upper lip of the vent is similarly evaginated to expose the lining of the cloaca. In a properly vaccinated bird the membrane will be found to be reddened, somewhat swollen, and covered with mucus, flakes of cheesy material, or, in some cases, a cheesy pellet will be found. The failure of a "take" is evidenced by a lack of reaction. A sample of 100 birds should be examined. If 95 or more show "takes," vaccination may be considered successful; it being assumed that the remainder of the flock vaccinated at that time would evidence similar reactions. If a lesser number exhibit "takes" it is advisable to examine the entire flock and re-vaccinate the birds showing no reaction. Re-vaccination is accomplished easily by dipping the bristles of the brush in the exudate on the lining of the cloaca of a bird that shows a "take" and then using the brush to re-vaccinate the bird that fails to show the reaction. It is of extreme importance that examination for "takes" be made, since "no-take" birds in a vaccinated flock are susceptible and will react the same as non-vaccinated birds when exposed to infection. Failure to produce a high percentage of "takes" may be due to any of the following reasons: holding vaccine too long, insufficient mixing, holding vaccine in suspension too long, improper application, under-dosage, washing out of vaccine through diarrhea and immune birds as a result of former exposure to the disease.

Conclusion.—When properly done, vaccination does not disturb the general appearance of the birds. Young birds continue to eat and gain in weight, while in laying birds no perceptible reduction in production may be noted other than may be accounted for by the handling of the birds. Careful attention should be accorded the vaccinated flock, however, in an effort to provide for their welfare and comfort. Therefore vaccination with a potent vaccine is recommended in the control of infectious bronchitis in chickens and pheasants, species known to be susceptible to this disease.

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Epidural Anesthesia in the Cow and Horse

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LITERATURE on epidural anesthesia seems to be very limited. But little has been written on the subject which gives a clear and practical understanding of it. This form of anesthesia was brought to the attention of veterinarians of this country through the work of Benesch[1] only a few years ago. He demonstrated its usefulness in cattle only. The value of this form of anesthesia in the horse, swine, dog and cat was demonstrated by McLeod and Frank.[2]

Many practitioners are still somewhat skeptical as to the use of epidural anesthesia. They fear injury to the spinal cord that might paralyze the patient for an indefinite period; or bring about other disastrous complications. Others probably have used an improper technique, and thus were unable to obtain satisfactory results. A general review of the anatomy of the posterior portion of the spinal cord as well as of the nerves, which have a direct bearing on the technique for this form of anesthesia may be advantageous.

There are six pairs of lumbar nerves. The dorsal branches are distributed to the muscles and skin of the croup and loins, the ventral branches to the sublumbar muscles. Of the latter, the last three pairs usually anastomose with the ventral branches of the first two sacral nerves to make up the lumbo-sacral plexus. The nerves of the pelvic limb are derived from this plexus.

Of the sacral nerves, there are five pairs. Their dorsal branches ramify in the muscles and skin of the sacral region, and adjacent part of the tail. The third and fourth ventral branches are connected with each other, and their nerve fibers are distributed to the urethra, bladder, rectum, penis of male, clitoris and vulva of female, and the skin and muscles of the anus. The fifth dorsal and ventral branches join the first dorsal and ventral coccygeal nerve branches from which fibers are given off to the dorsal and ventral muscles of the tail. The remaining coccygeal nerve branches, also supply the dorsal and ventral muscles of the tail.

The structure of the spinal cord and its nerves is the same for both species (cow and horse). The spinal cord narrows down to a conical point (conus medullaris) which terminates about opposite the first sacral foramen. This cord is then extended for a short distance by small (filamentous) nerves termed filum terminale. According to Sisson, the conus medullaris reaches only to the anterior part of the sacral canal, so that the roots of the sacral and coccygeal nerves extend backward in the spinal canal for a considerable distance forming a leash of bundles, in the center of which lies the conus medullaris and filum terminale. This arrangement is expressly designated "cauda equina."[3] To carry it a little further, on either side of the vertebral column each of these sacral and coccygeal nerves come through its respective intervertebral foramen, and divide into a dorsal and ventral branch. On either side these ventral branches are connected with each other by a small filament and form a composite nerve trunk (ventral nerve trunk). The dorsal branches form a composite nerve trunk (dorsal nerve trunk) in much the same manner.

For protection in the spinal canal, the nerves have their respective vertebral arch, while the intervening space between the vertebrae is covered over by a tough fibrous tissue. There is also a deposit of fat in between and around the nerve bundles which helps in deflecting the needle and thus prevents injury. If, however, one should sever,

completely, one of these coccygeal nerves, it would do little harm. One could sever two nerves without serious consequence; for other branches of the coccygeal nerves would be able to supply the muscle. Injuring the spinal cord in applying epidural anesthesia is entirely out of the question. The spinal cord is too distant in the first place; in the second place the needle would have to be misshapen in some way in order to reach the cord through a fused sacrum.

Perhaps the most important nerves that have been mentioned are the lumbar and sacral, especially that group which supplies the abdominal muscles which are associated with straining. The anesthetic, therefore, must flow from the site of the injection as far forward as the lumbar nerves. Too much anesthetic (overdose) will result in greater paralysis of the hind limbs of the patient as well as prostration. There is, however, no lasting after effects from an overdose.

Benesch[1] recommended a one per cent solution of tutocaine, an anesthetic. It has been much used by Fincher with a high degree of success. There are many other agents which may serve the purpose, as, for example, a two per cent solution of procaine recommended by McLeod and Frank. According to Fincher, in order to prevent straining in cows suffering from septic metritis, quinine and urea hydrochloride (0.75%-1%) solution should be substituted for tutocaine or procaine. Quinine and urea hydrochloride anesthesia lasts much longer (three to four days), than cocaine derivatives and this long period of anesthesia is necessary to successful treatment.

In the horse, epidural anesthesia is employed in such operations as amputations of the tail, castrations, and in obstetrical manipulations. In the horse, the first coccygeal vertebra is usually fused with the sacrum, and therefore the space between the first and second coccygeal vertebrae is used for the site of the injection. When the tail is lifted vertically, a depression is noted on the dorsal surface just between the first and second coccygeal space. The instruments (syringe and needle) and the site of injection are now cleansed with some antiseptic solution.

A 16-gauge needle with a shaft of 1¼ to 1¾ inches in length is thrust downward and forward, at an angle of about 45°, directly into the middle of the designated depression until it reaches the base of the spinal canal. The needle is then lifted slightly and the anesthetic, at body temperature, is injected slowly. Usually 18cc to 20cc of a one per cent solution of tutocaine will induce sufficient anesthesia to prevent straining or undue pain. This anesthesia usually lasts about a half hour. The administration should be repeated as may be necessary.

Bovine epidural anesthesia is employed chiefly to prevent straining and undue pain in dystocia, prolapsed uterus, and other obstetrical manipulations. The site of the injection may be the same as in the horse; or the anesthetic may be introduced between the last sacral and first coccygeal space. The technique is nearly the same except that one may use a 16-gauge needle, one inch in length. This needle also is thrust into the middle of the depression, but in a more vertical direction.

The same amount of anesthetic may be employed, as in the horse, 18cc to 20cc. This should take effect in ten to fifteen minutes and last half an hour, or longer. In a prolapsed uterus, however, and especially when the cow is down and unable to get up it is advisable to use 30cc to 40cc of the anesthetic.

Epidural anesthesia in horses and cattle is the most important factor in the control of a patient that is straining. It is safe, economical, and can be applied safely by any veterinarian.

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Correction

On page 218 (fourth paragraph) of the May issue of VETERINARY MEDICINE, a typographical error occurs in stating the dose of tetrachlorethylene for a dog; "1cc per pound body weight," should read: "0.1cc per pound body weight." Get your May issue, please, and make the correction NOW.

The Common Palisade Worm; Strongylus Vulgaris

By R. T. GILYARD
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THE *Strongylus vulgaris* is an intestinal parasite, reputed to be present in nearly all members of the equine species.[1] This nematode, together with other strongyles parasitizing the horse, such as the edentatus and the equinus, are frequently spoken of as palisade worms.

Infestation is of a chronic nature. Foals becoming infected at the sides of their dams, will in many instances, harbor the parasite throughout their normal lives. The life cycle of the *S.vulgaris* is a prolonged one; Glage states that the development to sexual maturity requires about one year.[2]

Strongyle larvae lodging in the mesenteric arteries, the aorta or the ileacs constitute the most common cause of thrombosis in domestic animals. Interference with intestinal circulation as a result of mesenteric obstruction, predisposes to colic and to intussusception and greatly reduces the working capacity of the animal. Gross indications of infestation are manifested only when the development of mesenteric aneurysms have progressed to the extent that intestinal circulatory disturbances have been established. Thus, the absence of arterial blood and the increased carbon dioxide content of the blood and tissues act as a stimulus to peristalsis. Contractions may become violent, leading to colicy pain and purgation. Heavily infested young animals fail to develop in proportion to the feed consumed. This is especially true in the case of the light breeds. Common post-mortem observations are aneurysmal changes in the initial region of the anterior mesenteric artery, as well as parasitic nodules in the small arteries of the large intestine.

The following classification indicates the taxonomic position of this parasite:

Phylum	Nemathelminthes
Class	Nematoda
Order	Eunematoda
Superfamily	Strongyloidea
Family	Strongylidae
Subfamliy	Strongylinae
Species	Strongylus vulgaris

The principal pathogenetic accomplishment of this parasite, as has been previously mentioned, is the formation of a mesenteric aneurysm. According to general belief this development begins by adherence of the larvae to the intima, followed by its penetration. Inflammation and the formation of blood coagula result in a chronic thickening and dilatation of the vessel wall. Diminution of the lumen rarely goes on to complete obliteration in a main trunk, but complete obstruction of lateral branches frequently occurs. Verminous thrombosis of the aorta and the ileacs, producing an intermittent posterior paralysis and permanent uselessness of the affected animal, has been described.

In the life history of the *S.vulgaris* there appears to be no intermediate host. The development of infective larvae to sexual maturity appears to be dependent upon their passage through the circulatory system. This is begun by their penetration of the intestinal mucosa, after which the portal vein is followed to the liver. The larvae pass through this organ and arrive in the right heart, by way of the posterior vena cava and thence to the lungs, left heart, and systemic circulation. The right heart may be reached also by traversing the lymph system, thus avoiding the liver. Others have expressed the opinion that the larvae migrate actively up the mesenteric artery following their penetration of the intestinal mucosa. Migration of the larvae from the mesenteric vessel, after an indefinite delay at that point, to the intestine, is probably carried out by the arterial blood current. They then lodge in the small arteries of the large intestine producing a characteristic nodule in which they develop to sexual

maturity. The entire process requires about one year.[3]

The sexually mature females deposit their eggs in the large intestine. While undergoing division, the eggs pass out in the feces. They do not hatch until arriving at favorable conditions of temperature and moisture outside of the body of the host. The eggs are large, oblong structures about 50 by 80 microns and may be seen readily in fecal smears under the low power of the microscope. Voided eggs hatch in a day or two and the larvae feed on adjacent manure. Two molts then occur in rapid succession; the second gives rise to infective larvae which are able to maintain life and remain a potential infective danger for a long period.[4]

Invasion of infective larvae is probably brought about by contaminated drinking water or feed. Licking moist stable walls, grazing on marshy pastures, or eating hay harvested from swamp meadows are also possible means of invasion. After invading a host the larvae appear to progress rapidly as mesenteric aneurysms have been described in foals four and five months of age.[5] It is quite astonishing how few horses are free from this infection. It is probably the most widely spread equine parasite.[6]

The exclusion of strongyles appears to be the most logical control measure. Rotation of pastures, avoiding low and wet lands, stable sanitation and preventing larvae from reaching the infective stage are the principal factors in control. Many thoroughbred nurseries in Kentucky practice a control program along these lines. Droppings are removed from pastures before parasitic material can develop and spread, and egg sterilization of manure prior to its use as a fertilizer is a common practice. This is accomplished by steam sterilization in a suitable bin or by placing the fecal matter in a double walled insulated chamber and allowing it to remain there until its own heat of fermentation has destroyed any existing parasitic life.[7]

Vermicidal medication has proved highly effective especially, when begun in weanlings and repeated thereafter annually or biennially. At the present time this is a profitable and highly recommended practice on the breeding farms in Kentucky. It is needless to mention that the elimination of palisade worms from brood mares is an important measure in protecting foals. Carbon tetrachloride and oil of chenopodium are believed to be the most effective drugs. The former is ordinarily administered alone in capsules; 25 to 50cc for a thousand pound animal. It is less popular than the latter, on the ground of its greater toxic potentialities. Oil of chenopodium is given on the basis of 1cc per hundred pounds of body weight, after a 36-hour fast. It is administered in a quart of linseed oil via a stomach tube. The amount of linseed oil is relatively decreased when treating colts and foals. Purgation follows in the course of 24 hours. Dead strongyles will be found in the feces for several days.

Among a great many practitioners, there seem to be two predominating ideas with reference to strongyle parasitisms. The first is that infestation is more or less universal and is of little pathogenic significance. The second belief is that the common equine vermicides are relatively ineffective against palisade worms. This is quite true with reference to oil of turpentine, copper sulphate, iron sulphate, arsenic and tartar emetic, but the pathogenic potentialities of strongylosis are now becoming more and more apparent. The protection of foals is undoubtedly the most important factor in control measures. Frequently mature horses reputed to be "poor keepers," will show an abundance of eggs on a fecal smear. If such animals are treated successfully, they show a gain well worth the effort of worming them.

It is a safe conclusion that equine palisade worm control has its place in the present-day war against parasites. The method of treatment is rational and the results frequently profitable.

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THE *Strongylus vulgaris* is an intestinal parasite, reputed to be present in nearly all members of the equine species.[1] This nematode, together with other strongyles parasitizing the horse, such as the edentatus and the equinus, are frequently spoken of as palisade worms.

Infestation is of a chronic nature. Foals becoming infected at the sides of their dams, will in many instances, harbor the parasite throughout their normal lives. The life cycle of the *S.vulgaris* is a prolonged one; Glage states that the development to sexual maturity requires about one year.[2]

Strongyle larvae lodging in the mesenteric arteries, the aorta or the ileacs constitute the most common cause of thrombosis in domestic animals. Interference with intestinal circulation as a result of mesenteric obstruction, predisposes to colic and to intussusception and greatly reduces the working capacity of the animal. Gross indications of infestation are manifested only when the development of mesenteric aneurysms have progressed to the extent that intestinal circulatory disturbances have been established. Thus, the absence of arterial blood and the increased carbon dioxide content of the blood and tissues act as a stimulus to peristalsis. Contractions may become violent, leading to colicy pain and purgation. Heavily infested young animals fail to develop in proportion to the feed consumed. This is especially true in the case of the light breeds. Common post-mortem observations are aneurysmal changes in the initial region of the anterior mesenteric artery, as well as parasitic nodules in the small arteries of the large intestine.

The following classification indicates the taxonomic position of this parasite:

Phylum	Nemathelminthes
Class	Nematoda
Order	Eunematoda
Superfamily	Strongyloidea
Family	Strongylidae
Subfamliy	Strongylinae
Species	Strongylus vulgaris

The principal pathogenetic accomplishment of this parasite, as has been previously mentioned, is the formation of a mesenteric aneurysm. According to general belief this development begins by adherence of the larvae to the intima, followed by its penetration. Inflammation and the formation of blood coagula result in a chronic thickening and dilatation of the vessel wall. Diminution of the lumen rarely goes on to complete obliteration in a main trunk, but complete obstruction of lateral branches frequently occurs. Verminous thrombosis of the aorta and the ileacs, producing an intermittent posterior paralysis and permanent uselessness of the affected animal, has been described.

In the life history of the *S.vulgaris* there appears to be no intermediate host. The development of infective larvae to sexual maturity appears to be dependent upon their passage through the circulatory system. This is begun by their penetration of the intestinal mucosa, after which the portal vein is followed to the liver. The larvae pass through this organ and arrive in the right heart, by way of the posterior vena cava and thence to the lungs, left heart, and systemic circulation. The right heart may be reached also by traversing the lymph system, thus avoiding the liver. Others have expressed the opinion that the larvae migrate actively up the mesenteric artery following their penetration of the intestinal mucosa. Migration of the larvae from the mesenteric vessel, after an indefinite delay at that point, to the intestine, is probably carried out by the arterial blood current. They then lodge in the small arteries of the large intestine producing a characteristic nodule in which they develop to sexual

maturity. The entire process requires about one year.[3]

The sexually mature females deposit their eggs in the large intestine. While undergoing division, the eggs pass out in the feces. They do not hatch until arriving at favorable conditions of temperature and moisture outside of the body of the host. The eggs are large, oblong structures about 50 by 80 microns and may be seen readily in fecal smears under the low power of the microscope. Voided eggs hatch in a day or two and the larvae feed on adjacent manure. Two molts then occur in rapid succession; the second gives rise to infective larvae which are able to maintain life and remain a potential infective danger for a long period.[4]

Invasion of infective larvae is probably brought about by contaminated drinking water or feed. Licking moist stable walls, grazing on marshy pastures, or eating hay harvested from swamp meadows are also possible means of invasion. After invading a host the larvae appear to progress rapidly as mesenteric aneurysms have been described in foals four and five months of age.[5] It is quite astonishing how few horses are free from this infection. It is probably the most widely spread equine parasite.[6]

The exclusion of strongyles appears to be the most logical control measure. Rotation of pastures, avoiding low and wet lands, stable sanitation and preventing larvae from reaching the infective stage are the principal factors in control. Many thoroughbred nurseries in Kentucky practice a control program along these lines. Droppings are removed from pastures before parasitic material can develop and spread, and egg sterilization of manure prior to its use as a fertilizer is a common practice. This is accomplished by steam sterilization in a suitable bin or by placing the fecal matter in a double walled insulated chamber and allowing it to remain there until its own heat of fermentation has destroyed any existing parasitic life.[7]

Vermicidal medication has proved highly effective especially, when begun in weanlings and repeated thereafter annually or biennially. At the present time this is a profitable and highly recommended practice on the breeding farms in Kentucky. It is needless to mention that the elimination of palisade worms from brood mares is an important measure in protecting foals. Carbon tetrachloride and oil of chenopodium are believed to be the most effective drugs. The former is ordinarily administered alone in capsules; 25 to 50cc for a thousand pound animal. It is less popular than the latter, on the ground of its greater toxic potentialities. Oil of chenopodium is given on the basis of 1cc per hundred pounds of body weight, after a 36-hour fast. It is administered in a quart of linseed oil via a stomach tube. The amount of linseed oil is relatively decreased when treating colts and foals. Purgation follows in the course of 24 hours. Dead strongyles will be found in the feces for several days.

Among a great many practitioners, there seem to be two predominating ideas with reference to strongyle parasitisms. The first is that infestation is more or less universal and is of little pathogenic significance. The second belief is that the common equine vermicides are relatively ineffective against palisade worms. This is quite true with reference to oil of turpentine, copper sulphate, iron sulphate, arsenic and tartar emetic, but the pathogenic potentialities of strongylosis are now becoming more and more apparent. The protection of foals is undoubtedly the most important factor in control measures. Frequently mature horses reputed to be "poor keepers," will show an abundance of eggs on a fecal smear. If such animals are treated successfully, they show a gain well worth the effort of worming them.

It is a safe conclusion that equine palisade worm control has its place in the present-day war against parasites. The method of treatment is rational and the results frequently profitable.

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Injuries of Polo Ponies

Polo is a sport with which the veterinarian is coming more in contact each year. It is fast becoming as popular with men of moderate means as it has long been with the rich. A score of years ago, the polo center of the United States was Long Island, with those who went south for the winter taking their ponies with them and continuing the sport at Aiken. Today polo is played throughout the country. That sport enthusiasts are taking to it was shown by the attendance and interest in the recent "East-West" games. Naturally there has been an increase in polo pony breeding. It will be advantageous for veterinarians to become familiar with the game and acquainted with the injuries to the mounts that are more or less peculiar to it.

Among the more common injuries are mallet injuries. These may vary from a simple bruise to a severe break in the skin and rupture of the digital or common digital artery. At times the small metacarpal bones may be fractured, or a periostitis may be set up in the lower leg region. Although the playing pony is booted, at least on the fore legs, these accidents are bound to happen once in a while. Mallet injuries are not confined to the legs, but are not serious on portions of the body protected by the muscles. Injuries to the head are not rare and may retire the pony from the game permanently. A few years ago I saw the eye of a valuable pony ruptured by a back hand stroke. As the rules specify that a pony blind in one eye may not be played this pony had to be sold for a saddle horse.

Severe cuts in the region of the fetlock are often seen, in ponies that are clumsy in stepping over the sideboards during fast play. Fractures are not uncommon and usually involve the first or second phalanges. These are usually caused by the pony pivoting quickly. If the pony is rested for five or six months, many of these fractures will prove amenable to treatment. Occasionally a pony is knocked down and may be injured in this way. If he happens to strike on the point of the hip the tuber coxae may be broken off. Such an accident results in a pony with his hip "knocked down," spoiling the conformation of the animal but not necessarily disqualifying him permanently from playing. Ponies playing indoors may burn or bruise themselves by bumping the walls in fast play, although these injuries usually are not serious.

As in the case of race horses, wounds of the mouth may result from severe bitting or from riders who bear too hard upon the reins. Such wounds are first noticed by the player, who complains that his mount does not want to extend himself, or that the pony shakes his head and fights the bit, especially when checking him. These can be corrected by proper bitting of the pony, or a hackamore bridle may be used for a while if the mouth is quite sore.

Many ponies appear to be lame after a game or a prolonged work-out. In many such cases ridges will be found where a boot strap has been pulled too tight, thus cutting off the circulation to the part and causing the lameness which disappears within a few hours after removal of the boots.

All of these injuries and many others may be seen at any polo club. If one understands the fundamentals of the game it should facilitate the diagnosis, as the cause will be more clearly understood. In conjunction with this work many valuable contacts are made which cannot help but increase one's equine practice, and so prove beneficial to the practitioner in districts where the game of polo is played.

Wm. E. Eggert, Jr.,
Ithaca, N. Y. N. Y. S. V. C., '35.

Stubborn Case of Sarcoptic Mange in a Dog

A five-year-old Springer spaniel was brought to my office last summer, which had been treated several times previously by the owner for eczema, with apparently negative results, as the patient was in a filthy mess of sores and scabs.

Microscopic examination revealed sarcoptic mange. Having on hand a new proprietary brand of mange mixture, the dog was treated as per labelled directions and

the owner requested to bring the dog back for final treatment in five days. This he did, and the treatment was given. The dog and his owner departed for the summer.

Two months later, this dog was returned in a far worse condition than previously. The owner suggested destroying him, if no cure could be found. I told him I would use an old stand-by treatment. This comprised a liberal application of a warm mixture of ol. lini, ol. ricini and kerosene, equal parts, with enough flowers of sulphur to make a pink solution. It was applied over the whole body with a small brush. The mixture was allowed to dry on, and the process repeated in three days. Complete recovery and a contented owner resulted.

F. M. Wheatley,
Sherbrooke, P. Q., Canada.

Ulcerative Keratitis

The eye is one of the most delicate organs of the body. The cornea, due to its meager blood supply, recovers from injuries but slowly. It is highly resistant to external injury, but once injured, repair is delayed or may not occur at all. If infection of the cornea is not brought under control promptly, blood vessels extend into it from the sclera; the increased blood supply being an attempt of nature to gain control of the situation. After the infection has subsided, the blood vessels disappear. Probably because of this fact, corneal scars disappear slowly.

A three-year-old male Boston terrier was brought to the clinic with a history that the left eye had been sore and opaque for about a week. In the center of the cornea there was an ulcer about a quarter of an inch in diameter. Fluorescein solution, one per cent, in two-and-one-half per cent sodium bicarbonate solution, was instilled into the eye; staining the ulcer green. It was quite deep and apparently enlarging. The ulcer was cauterized with liquefied phenol, after first anesthetizing the eye with five drops of a two per cent butyn solution. A small probe was dipped into liquefied phenol, well shaken, and the adhering film of phenol applied to the green area of the ulcer.

For the next five days the eye was washed daily with a warm boric acid solution and a five per cent yellow oxide of mercury ointment was applied. The ulcer was not healing; a ring of blood vessels was visible, progressing from the edge of the cornea toward the ulcer. Therefore it was again outlined with the fluorescein solution and cauterized with liquefied phenol. The use of the yellow oxide ointment was continued. Ten days later the ulcer perforated the cornea. The ulcer was again cauterized as before and the same daily treatment continued. In addition, a few drops of a one per cent solution of atropine sulphate were instilled into the eye daily to control the pain. After five more days, or twenty days altogether, the ulcer was healing and the ring of blood vessels had nearly disappeared. The use of one-sixteenth of a grain of powdered dionin was alternated with the yellow oxide of mercury ointment for the next twelve days, after which the patient was discharged. At that time the ring of blood vessels had disappeared and, fortunately, little corneal scar was left.

The fluorescein is used, first to diagnose the condition, and then daily the more easily to follow the progress of the infection or of healing. It is also thought to have certain therapeutic value. The yellow oxide of mercury ointment has long been used in the treatment of eye conditions, and a five per cent ointment aids in control of the infection and stimulates resorption of corneal scars. Dionin is etlylmorphine hydrochloride. It is a corneal lymphogogue, which aids in the elimination of the products of infection.

The single fact which impresses one most in the care of ulcerative keratitis, and for that matter other diseases of the eye, is the fact that routine treatment is so unsatisfactory. One never knows exactly just what to do. Each case has to be taken as it comes, and a decision made as to the line of treatment. More often than not, within 24 hours, treatment has to be changed. The only routine remaining is to keep an open mind and a lack of definite predetermined treatment.

H. D. Cain,
Ithaca, N. Y. N. Y. S. V. C., '35.

Neoplasm in the Brain of a Dog

A two-year-old, English setter, with a history of having had distemper when a year old, was brought to the clinic of the New York State Veterinary College on November 6, 1934. He was showing peculiar nervous symptoms. The owner stated that the animal at first began to hold his head to one side and then to make complete turns to the left. These circling movements later were exaggerated and could be induced by excitement. The left side of the face twitched intermittently, and the left eye squinted. There had been deafness, but this gradually disappeared.

Examination in the clinic revealed poor eyesight with a tendency towards fixity of the eyeballs. By banging on an empty pail, we suceeded in startling the animal only when the noise was near him. Contrary to opinion, the dog was still somewhat deaf. The animal circled to the left with the head inclined to the left. No external cause for the circling could be found. The animal was in excellent condition, bright and had a normal appetite.

At the request of the owner, the animal was destroyed November 11th. A complete autopsy was performed which revealed no evidence of disease except a tumor at the base of the brain, extending anteriorly from the pontal protuberance or the pons to the optic chiasma and between the piriform gyri. Its general shape was triangular, with the base at the pons and the apex at the apex of the optic chiasma. The tumor measured from apex to base, 3.2 centimeters, and at its widest point three centimeters, tapering to five millimeters at its narrowest point. The bones of the floor of the skull were flattened and misshapen over an area corresponding to the tumor. The brain was sectioned transversely in five places, and the tumor could be seen to have a direct connection with the right side of the brain and seemed to grow out of it. There was a limited hydrocephalus with distension of the fourth ventricle.

Slides prepared for microscopic examination by the paraffine method and stained with hematoxylin and eosin, showed the tumor to be of glial type. There were many small glial cells scattered widely and evenly over the field. There were many blood vessels scattered over the field. Some areas revealed a much larger cell, that had what appeared to be, protoplasmic processes,

VENTRAL SURFACE OF DOG'S BRAIN

The growth occupies the center of the base of the brain and is quite extensive. The blood vessels show clearly, indicating the extent to which the tumor was nourished. A. Oculomotor nerve; B. optic chiasma; C. prontal protuberance or pons; D. and D'. piriform gyri; E. body of the tumor.

many with eccentric nuclei, and taking a light basiphylic stain.

The fourth or trochlear nerve was buried under the growth while the oculomotor nerve was stretched and misplaced around, but not absorbed in the growth.

The pontal protuberance was pushed posteriorly and flattened dorsally. The optic chiasma was displaced to the front. The

mammillary bodies, cerebral peduncles and tuber cinereum were covered and showed evidences of pressure. The stalk of the hypophysis or pituitary body was displaced around the tumor.

The portion of the brain involved in the tumor was the seat of harmony of motion and equilibrium. As some of the cranial nerves arise here, destructive process or undue pressure cause sensory and motor disturbances in the region of the face, lips, eyes and ears. Involuntary movements of the limbs, head, neck and eyes are the most common effects.

Pressure on the cerebral peduncles can account for the loss of hearing. The auditory fibres run through the cerebral peduncles into the internal capsule, to the site of the conscious hearing in the brain. Pressure on the optic nerves accounts for the poor eyesight of the animal. The stretching of the trochlear and oculomotor nerves was shown by the fixity of the eyeballs. Pressure on the right side of the brain caused the turning movements to the left as such an animal turns towards the normal side, never to the side affected.

On the whole, symptoms of the above nature, are usually pathognomonic of a brain lesion. They are hopeless cases. The treatment is purely surgical, and should not be attempted.

E. N. Foster,
Ithaca, N. Y. N. Y. S. V. C., '35.

Recent Developments in the Handling of Fractures

During the past five years great progress has been made in the small animal field in improving the treatment of fractures. This may be attributed in part to the use of the X-ray before and after reduction of fractures. The X-ray revealed surprisingly poor alignment of the bones in fractures of the femur and humerus, handled by methods that were formerly routine. The number of fractures due to automobile injuries has kept pace with the increase in the use of motor cars by the general public. With this increase in fracture work the importance of avoiding sending dogs from the hospital with a limp caused by poor reduction of the fracture, became more apparent. The public too has come to demand better work of the veterinarian in this field. To meet the demands of the public and to achieve personal satisfaction in their work, Schroeder,[1] Dibbell,[2] Self,[3] Ehmer and Stader[5] have modified and applied the methods used in the treatment of fractures by the medical profession and fortunately have met with gratifying success in applying these methods to small animals.

There are four ways of treating fractures: The first requires no manipulation at all, and is used in partial or greenstick fractures, where the fracture line does not run completely through the bone.[6] A splint or cast is all that is necessary to be put on.

The second method is by manipulation, in which reduction is accomplished by manual reduction, and requires skill and not force. The reduction is maintained by a cast or splint. This is the method used by most veterinarians.

The third method is by traction, which is used when manipulation fails or is inadvisable.[2] In fractures of the femur and the humerus traction is needed because the force of the muscle spasm is so great that it is difficult to get the ends of the bones into good apposition and alignment and still more difficult to keep them there. In this type there is always an upward displacement of the lower segment; caused by the unopposed contraction of all the thigh or arm muscles, originating above, and having their insertion below the fracture. To counteract this action, it is necessary to employ continuous countertraction.[1] This is particularly true of the spiral and oblique fractures, since the ends of the bone keep sliding over one another into their former position. Obviously some form of traction must be applied to keep the ends in apposition. Traction may be applied in either of two ways: skin traction or skeletal traction. It is first necessary to anesthetize the animal, to get complete relaxation of the muscles. Skin traction is applied by means of adhesive strips applied

to the leg and attached to the ventral bar of a modified Thomas splint in which the leg is fixed. This splint, as modified by Schroeder, consists of a ring which fits over the thigh at its junction with the pelvis and two bars extend from this ring, anterior and posterior to the leg to beyond the foot. This splint permits the proper circulation in the leg and enables the operator to stretch the leg as much as may be desired. This method has met with great favor with practitioners.

The other method of traction is skeletal traction, in which a hold on the leg is obtained not by adhesive tape but by inserting in the bone, tongs, or calipers, Steinman pins, Bohler, Kirschner or Anderson wires. The use of tongs or calipers for applying traction is the favored one in medical practice, but is of doubtful value in veterinary practice owing to less complete control of animal than human patients. Most veterinarians have refrained from using any form of skeletal traction because of the danger of introducing infection when the tongs or wires are inserted. However, with good aseptic technique little risk is taken. The advantages of this method are: In case of a compound fracture the wound is easily treated on account of the small area of contact of the tongs; the tongs are inserted directly into the bone,[1] thus getting direct traction; and the direction of traction on the bone can be controlled much easier than when applied to the skin. Bandages and rubber bands are used to maintain the traction. Steady traction is applied over a period of days, thus restoring length and preventing angulation.

The way in which Kirschner wires and Steinman pins are used is as follows: The area around the fracture is shaved, then disinfected with some antiseptic, such as bichloride of mercury or tincture of metaphen. The pins or wires are inserted above and below the fracture. It will be necessary to use a drill to insert the pins in the bone, after they have pierced the skin and musculature. A cast is then applied to the leg while the fracture is reduced. The ends of wire or pins are cut off even with the sides of the plaster cast and thus reduction is maintained. Stader[5] uses Kirchner wires, which are held in place by means of wooden splints. Pressure necrosis is prevented by plenty of cotton between the splint and the skin. Many types of splints have been devised to hold these wires or pins in place.

There remains one other method of setting fractures and that is by means of open reduction. This type of fracture reduction is in bad repute in veterinary medicine, because of the difficulty of avoiding or controlling infection. Infection is prone to occur on account of the lowered vitality of the tissue, and for this reason open reduction is usually deferred for five to seven days after the injury. Open reduction of simple fractures should be employed only when the other methods of skin and skeletal traction have failed, or are not applicable. Briefly the method employed is as follows: The area of the operation is shaved and disinfected, the skin and musculature is incised down to the bone, an internal splint of plates, screws and pegs, or of some absorbent material as, beef bone plates or pins, kangaroo tendon, chromic catgut, horn or autogenous bone grafts are applied to the ends of the fracture. It is to be understood that in open operation, even when combined with internal fixation, the fracture must be supported by careful external splinting and that union is not so prompt as by the closed method[4].

Great possibilities confront veterinarians in the treatment of fractures. There is still a great deal of work to be done, although much has been added to our knowledge in recent years.

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Stanley Penny,
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Construction and Architecture of a Small Animal Clinic

By DAVID BARSKY,
N. Y. S. V. C. '35
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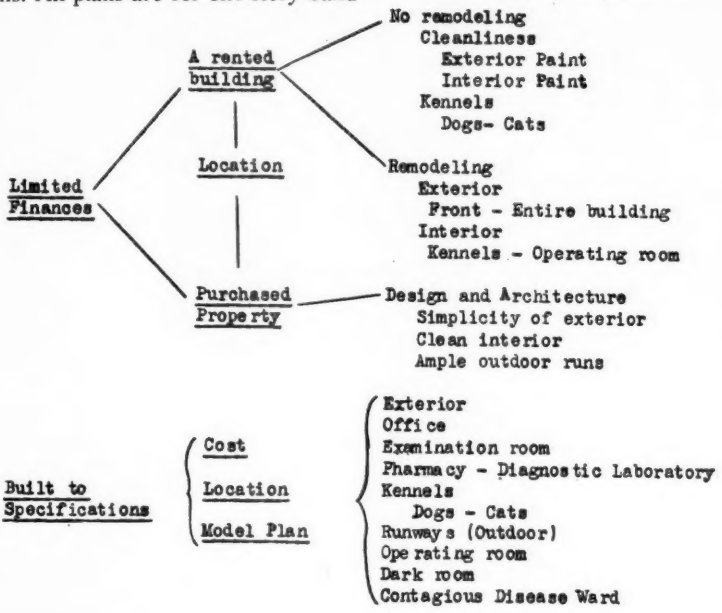
In order to get only the primary basic principles into this article and still keep it brief enough to be incorporated into a veterinary magazine, there must be no digression from the subject. Two types of buildings will be discussed: (1) where only limited finances are available, and (2) built to specifications. All plans are for one-story buildings.



Built to Specifications
- Cost
- Location
- Model Plan

- Exterior
- Office
- Examination room
- Pharmacy - Diagnostic Laboratory
- Kennels
  - Dogs - Cats
- Runways (Outdoor)
- Operating room
- Dark room
- Contagious Disease Ward

Systems

Ventilating
Natural - Artifical

Lighting
- Exterior
- Office
- Wards
- Operating Room

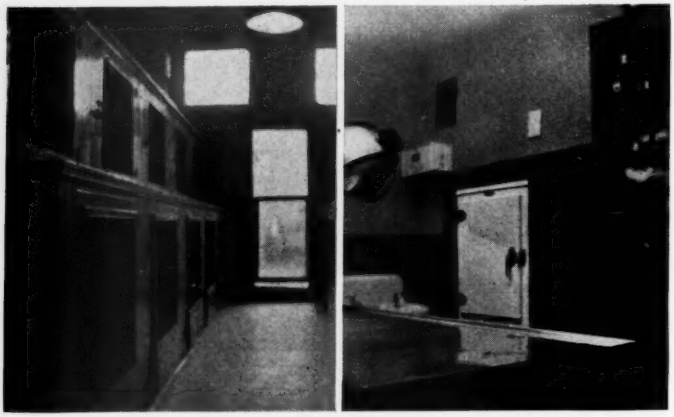
Heating
Location: Cold Climate: Coal - Oil; Warm Climate

Furnishings
- Office
- Wards
  - Kennels
  - Intra-Clinic Hospitalization
  - Private Offices

Limited Finances—Rented Building

The location for a small animal clinic, when the building is to be rented, is largely governed by the number of anticipated patients from that area. The desirability of a section in which there is no veterinarian can be seen easily. Of course, if no remodeling need be done, the expense saved is a factor which over-rides a more elaborate building where alterations must be made to adapt the structure to veterinary practice.

If no remodeling is to be done, cleanliness must be sought above all else, as any attempt upon the lessee's part to bring about this necessity entails an expense. Therefore, the paint on the exterior of the building should be neat and pleasing. In a city (except in the far West), the more conservative colors are desired, such as medium-dark grey, brown, or dark green. These suggested colors need not be strictly adhered to, as any building that blends with surrounding property is usually acceptable.



McCLELLAND VETERINARY HOSPITAL, BUFFALO, N. Y. Left: Ward for large dogs, showing double tier kennels. Note guards at the bottom of the doors to prevent soiling the floor of the room. Through the window in the background may be seen a "roof run." Right: Neat, compact, fully equipped examination room, with a solar lamp at the end of the table, and a built-in electric refrigerator in the wall on the right.

The interior should be painted a light color, preferably grey, but one that does not soil easily and one that can be washed readily. The usual plan is to have walls medium-dark grey (almost pearl grey), two-thirds of the walls' height, with the other third and ceiling white. This paint scheme should be consistent throughout the entire clinic, with the possible exception of the office or reception room, or both. In the office, the tenant may give vent to his own individual choice, the majority using conservative colors such as maroon or soft, dark green with mahogany furniture.

The kennels should be of ample size for the dogs that are to inhabit them. For the larger breeds, i. e., collies, German shepherds, setters, pointers, great Danes and similarly proportioned animals, we suggest kennels at least four feet in width and height, and approximately five feet deep. For terriers and like smaller breeds, we suggest kennels at least two and a half feet in width and height, and approximately three feet deep. If at all possible, kennels should be individually lighted. Some veterinarians favor steel kennels, but I do not approve of this plan because of the heat and sound conducting properties of steel. I prefer wooden or wood-fiber kennels with all rounded joints. Newspapers as a kennel floor covering are both economical and sanitary. Paper is obviously more easily changed, and with the expenditure of less time and effort than a sliding tray. The more simple the construction, the less probability of dirt accumulation.

Cat compartments should be of the same size as the kennels for small breeds of dogs. If possible, the cat ward should be isolated from the canine section for obvious reasons.

A Remodeled Building—Rented

Where the owner is willing to remodel, say from a gasoline station, feed store or other appropriate building, the only necessary exterior remodeling is the front. Neatness should prevail and an effort should be made to have it clash with immediate surroundings as little as possible. The owner of the building usually will observe the veterinarian's wishes, and the veterinarian should pass final approval upon the proposed refacing before the actual reconstruction begins.

In any interior remodeling, many win-

dows should be provided; the room with the most window space should be the kennel ward, since a well-lighted kennel ward is a welcome, self-sustaining advertisement.

In all rented property, the veterinarian must be governed by the rental fee and the period of his lease. If he plans to make his home in combination with his clinic, the rental fee should be considered as that of both a business property and a residence. The latter suggestion should be carefully considered as the advantages of a combination clinic and dwelling are many.

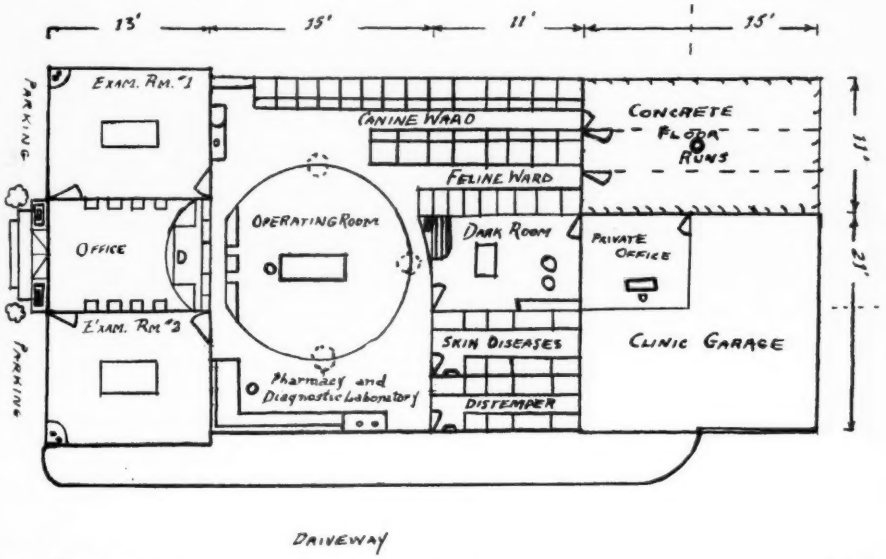
Built to Specifications—Cost

The practitioner who plans to build his own clinic must be prepared to spend at least $4,000 for his land and $4,500 for the ensuing construction upon it. Some may believe this to be an extravagant figure, but one who is going to build one's own clinic should build for permanence and for economy in maintenance. Any finished clinic that costs less than the above figures is either a rare bargain, or it is a piece of property that will double its cost in following years because of poor materials, bad construction or faulty workmanship. If one must reduce the outlay below this figure, it is better to rent.

Location

The city being the source of small animal practice, it is wise to build not too far from it. It is false economy to purchase too small an area of land. Extra land may be profitably converted into extra long, outdoor runs, a fact which I cannot over-emphasize. The surroundings and landscaping is left to individual taste. It is unnecessary to mention the advantages of a clinic surrounded by lawns and trees which add to the beauty of a modern hospital.

The following plan is one that meets the stipulated price, yet sacrifices nothing in its compactness and style. It contains a separate ward for contagious diseases, this divided into two classifications; and includes plans for a dark room, for X-ray and other electrical equipment. All plans are original and may be modified according to builders' or architects' views.



Building Equipment

Heating—In the warm climates a small burner should be used for hot water purposes. In the colder climates, coal seems to be preferable to oil for financial reasons.

Ventilating—A natural ventilating system can be utilized easily by employing shields

at the bottom of the windows to prevent drafts when the windows are open. The top windows may be lowered for proper circulation.

Lighting—The operating room should be naturally lighted only by a skylight. The absence of wall windows prevents outside contamination. The artificial lighting should be focused, holophane lights, and these are particularly important in the operating room. In the wards, as much window space should be obtained as possible so that natural light may be utilized to the fullest extent. Proper lighting of this nature is at once economical and gives a clean, pleasing atmosphere. Lightness tends toward cleanliness, which, figuratively speaking, should be the foundation of any small animal clinic. In the office, the lighting may be of conventional fixture type with some indirect lighting. The fixture selection is left to the furnisher's discretion.

Furnishings—In the office, standard furniture may be employed. The private office may be furnished to the individual taste, while the wards and laboratories are more professionally furnished by consulting any of the medical supply concern bulletins. The plumbing throughout the hospital is usually attended to by the constructor, but it must be remembered that when the bathing facilities are erected, a well-constructed stand for colonic and rectal irrigations be added, preferably a non-portable stand. I would suggest the use of linoleum on the floors throughout the building except in the operating room where tile floors are advisable.

In the model plan, a basement has been omitted, but it is advisable to include one in the construction. The basement may be used for storage, furnace facilities and installation of an incinerator. The incinerator used for burning deceased patients (and saving the ashes), is a practical and worth-while investment.

The concrete floor runs may be used alternately so that dogs cannot come in contact with each other.

It would seem to me that a feasible plan would be for the prospective builder to visit established clinics. From these, he will probably glean plausible ideas which may be incorporated in his own plans. In any clinic that has been designed for permanence, the following points comprise the skeleton: A pleasant exterior, which is necessary to form a favorable first impression; a neat, cheerful reception room, which continues the first impression; a well-lighted kennel ward containing large, airy kennels, which lessens the reluctance of animal owners to the possible "caged" condition of their pets; and finally, sanitary, concrete floored runs of unskimped dimensions, which support a famous hospital's slogan: "the welfare of your pet is our greatest desire."

Displaced Abdominal Viscera in a Young Collie

A fine collie puppy, nine months old had never been noticeably ill, but his continued playful barking had caused neighbors to complain to the owner. For this reason the puppy was sent to a hospital to be bathed and wormed prior to being given to a friend who lived in the country. The puppy was received in the morning, bathed that afternoon by the attendant and left in the kennel overnight to be fasted. The next morning it was dead in the kennel. On autopsy, the following abnormalities were noted.

All external appearances were normal, but the stomach and liver were in the thoracic cavity. The esophagus passed through its natural foramen in the diaphragm, then bent back through the diaphragm to the stomach. The stomach and liver appeared quite normal. The duodenum continued from the pyloric end of the stomach through the diaphragm into the abdominal cavity. The viscera in the abdominal cavity appeared normal in every respect. There were no old scars to indicate the stomach and liver had reached the thoracic cavity by rupture. All indications pointed to a congenital defect. This is not uncommon in the dog.

The cause of death was not revealed by the autopsy.

William E. Eggert, Jr.,
Ithaca, N. Y. N. Y. S. V. C., '35.

Drugs Used in Veterinary Medicine

By VICTOR LEWITUS,
Columbia University,
New York City.

VI. PHYSOSTIGMA—the Source of Eserine

History—Physostigma is the only source of physostigmine or eserine. Although it was only recently (1846) that it came into use medicinally, the natives of certain countries are known to have used it in ritualistic ceremonies for a long period. This drug is known also as the Calabar or ordeal bean, the latter name coming from its use in the trial of suspected criminals by barbaric tribes of western Africa. As part of a ceremonial, the bean is made into a paste, and the one on trial given a rather large portion to swallow. If the suspect survives, he is declared innocent and forthwith acquitted, but should he die he is adjudged guilty. If the guilt of the party under the ordeal is established by death, his property is, at once, confiscated and his wife and children are killed. So great is the faith of the natives in the infallibility of this test, that they do not hesitate to submit themselves to this type of trial and are said to volunteer frequently to go through the ordeal, in order to prove their innocence. The fallacy of this test is obvious. If the lot of seed from which the paste is made is relatively low in physostigmine, there will be mild effects or even though the dose be lethal certain individuals that vomit easily will become nauseated and escape its fatal effect. However, where a strong lot of seeds are made into a paste most of those who partake of the drug will be killed. In this way, an innocent infant will be found "guilty" and a habitual criminal may escape his punishment! To this day, the trial by ordeal is practiced in Africa by the cannibalistic tribes.

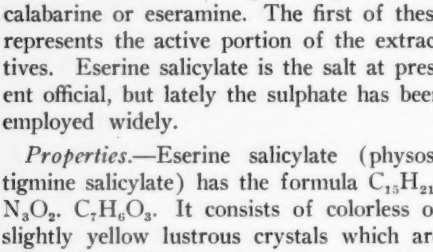
Source.—The ordeal bean comes from a plant known as *Physostigma venenosum,* a woody vine native to limited portions of western Africa. It is particularly abundant around the Gulf of Guinea and the mouth of the old Calabar River from which it derives one of its common names. The seed is called "esere" by the natives. From this is derived eserine, one name of the alkaloid. The plant is a woody climber reaching as much as fifty feet in length and bearing leguminous fruits somewhat like our common beans. The large pods usually contain three of the large seeds which make up the crude drug. They are of a very dark brown color, almost black, kidney shaped, and about an inch long and two-thirds of an inch wide. A rather prominent groove, bordered by a thin white membrane along one side of the bean is characteristic. The surface is somewhat smooth and has a distinct sheen. The seed has no special odor or taste. It belongs to the same family as the common bean and resembles it closely in shape. The seeds are collected and sent to the west coast of Africa from where it is exported in bags.

Physostigmine or eserine is extracted by treating the powdered crude drug with warm alcohol containing a small percentage of tartaric acid. The alcohol is separated from the extract and the residue is treated with water, made alkaline by adding potassium bicarbonate and shaken with ether which extracts the alkaloid, which finally is obtained by evaporation of the ether. From this step the various salts of the alkaloid are prepared. These include the salicylate, sulphate, hydrochloride, hydrobromide, citrate, borate, tartrate, and benzoate.

Preparations.—The drug and its fluid extract, tincture and extract were at one time official, but this has given way to the alkaloidal salt. The requirement was formerly

not less than 0.15 per cent of alkaloids, and a good grade would yield 0.20 per cent total. The chief alkaloids are physostigmine or eserine, eseridine or isophysostigmine, and calabarine or eseramine. The first of these represents the active portion of the extractives. Eserine salicylate is the salt at present official, but lately the sulphate has been employed widely.

Properties.—Eserine salicylate (physostigmine salicylate) has the formula $C_{15}H_{21}N_3O_2$. $C_7H_6O_3$. It consists of colorless or slightly yellow lustrous crystals which are somewhat soluble in water, more so in alcohol and chloroform and less so in ether. The solutions of this salt redden easily on exposure to the air, and must not be kept in stock for any length of time since it easily decomposes, due to moisture, even in



Calabar Beans
Fruit of the *Physostigma venenosum.*

the solid form. This change reduces the potency of the drug. Physostigmine sulphate (eserine sulphate) has the composition $(C_{15}H_{21}N_3O_2)_2.H_2SO_4$. It consists of white or slightly yellow crystalline scales or powder which is deliquescent and bitter to the taste. It reddens easily on exposure to air and light. It is easily soluble in water and alcohol, slightly soluble in ether. It should not be exposed to moisture or light. It will thus be seen that the alkaloidal salts of this drug are very sensitive to certain physical conditions and for this reason cannot be kept even in solid form unless sealed hermetically for they are very deliquescent, or when in solution they decompose to a dark red.

Action.—Physostigmine and its salts are classed as stimulants to the parasympathetic nerve endings. They therefore augment the function of secretory glands such as the mucous, salivary, sudorific, lachrymal, etc., since they act on the terminations of the secretory nerves in the gland cells. This effect, however, is only transient since the constricting effect of the drug upon the arterioles offsets the first action and thus the secretions are inhibited or checked completely. Its effect upon smooth muscle is most powerful in the digestive tract, increasing peristalsis markedly and often causing vomiting as well as purging. This action takes place whether the drug is given orally or hypodermically. By a similar effect, unstriated muscle in other parts such as the uterus, urinary tract, gall bladder, bronchioles and iris becomes contracted. Likewise, the muscular coat of the arterioles contracts because of a probable stimulation of the vaso-motor endings.

Because of the violent stimulation mentioned above, and also because of effects on the medulla, the blood pressure is increased; although the pulse is reduced by direct effects on the myocardium. The rise of blood pressure is followed soon by a fall, probably due to a paralysis of the vaso-motor center. With large doses of the drug, the blood pressure immediately falls and the pulse is slowed even more. The respiratory functions, at first quickened and strengthened by effects both on the centers and the bronchi, is later retarded and, from large doses, dyspnea and death may ensue from asphyxia due to a paralysis of the respiratory center.

In the case of the central nervous system, the cerebrum appears to be little affected as is shown by poisoned animals remaining conscious until the end. The medulla is at first stimulated and then depressed. Reflexes are depressed, and with large dosage a paralysis ensues beginning in the extremities. There is no effect on sensory nerves.

When applied to the eye, eserine is a powerful myotic, contracting the pupil in a few minutes, the myosis lasting for from

12 to 24 hours. This occurs also when the drug is given internally and is due to stimulation of the endings in the iris and ciliary muscles. The drug causes spasm of accommodation, often causing sight to be fixed for near objects, while distant objects are out of focus and the animal's vision is blurred. The intra-ocular tension is much lowered without any noticeable preliminary rise in tension. The use of the drug in the eye sometimes causes painful twitchings of the eyelids or spasms of adjoining muscles. Eserine is excreted rapidly in the urine, but, after ingestion, is found also in the saliva and bile in small amounts.

Therapeutics. — Physostigmine and its salts are useful mainly for their effects upon the alimentary canal where they powerfully stimulate the unstriated muscle. It is particularly useful in the treatment of obstinate constipation in horses, and may be given intravenously or subcutaneously. It is often combined with pilocarpine to insure proper secretion in the intestine, and also in combination with strychnine to counteract any depression on respiration, etc., that the eserine may bring about. The drug has an established place, along with pilocarpine, for prompt results in cases of flatulent colic and impaction of the cecum, colon and rectum in horses. It has also been of some use in expelling calculi and foreign bodies from the intestine. According to Quitman, eserine given subcutaneously in ½ grain doses every 20 or 30 minutes to effect, is far more effective in emptying the bowels than arecoline given in the same manner. Amadon recommends the drug as a ruminatoric in cattle in doses not over ¾ grain, and this may be repeated in an hour if necessary. It has a place also in impaction of the omasum, acute gastritis and for rapid evacuation of the bowels in these animals. It is also considered by some to be effective for constipation in dogs when given by mouth in doses of 1/60 to 1/12 grain twice daily.

Eserine is employed for its myotic effects, in one-half to one per cent solutions, in alternation with atropine to prevent or break up adhesions to the iris. It is also used to lessen intra-ocular tension in glaucoma and to prevent a prolapse of the iris when the eye has been injured or is affected with corneal ulcers. It is at times used to antagonize the pupilary effects of atropine since the latter dilates the iris. Physostigmine is contraindicated in spasmodic colic because it may intensify the pain by violently increasing the bowel movements; when the stomach or intestines are greatly overloaded or distended since rupture of the walls may result; when animals are pregnant, because of the threat of abortion due to its activity, and in chronic tympanites in cattle.

DOSE TABLE

		Animal	Apothecary	Metric
Eserine or Physostigmine Sulphate and Salicylate (hypodermically)	H		....gr.1/4-i	.015-.065
	C		....gr.3/4-iii	.05-.2
	S		..gr.1/6-1/2	.01-.03
	D	gr.1/120-1/20		.0005-.003
		Swine	gr.1/12-1/3	.005-.02

NOTE: These drugs must be kept dry (sealed) and away from light until ready for solution. Solutions must be fresh.

Toxicology.—Physostigma and its alkaloidal salts are well known for their toxicity because of their use in the trial by "ordeal" in western Africa. When it poisons, it causes a marked muscular weakness beginning in the extremities, and accompanied by a twitching and tremor which resembles convulsions. The pupils are contracted, the body is covered with sweat, there is vomiting and diarrhea. The heart action is at first slow and later it becomes very weak; and the blood pressure is good at first but later is lowered. The breathing is at first quickened but deep, and later becomes shallow and very difficult. Later there may be clonic convulsions and death usually comes from paralysis of respiration. The best physiological antidote is atropine or belladonna which counteracts the convulsions, dyspnea, diarrhea and intestinal cramps. Some recommend the subcutaneous injection of magnesium sulphate, which is partly antidotal. Often the collapse must be given attention, and special attention must be given to the threatened heart action. It is worth noting that the animal does not lose consciousness in these cases until the very end.

Book Review

Lehrgang der Histopathologie (Syllabus of Histopathology), by Oskar Seifried. 195 pages, 142 illustrations, published by J. Springer, Berlin, 1934.

Within the compass of the subjects comprising veterinary science, great import must be placed upon histopathology. There is probably no other branch of the veterinary college curriculum, a knowledge of which can stimulate and increase the mental grasp of the nature, course and termination of disease in a similar manner. The art of histopathology consists in combining the skill of morphological observation with sound physiological thinking. Therefore, histopathology can never be studied by itself; but its study must be directed toward the recognition and understanding of the morbid processes in their entirety. Another of its tasks is to reveal morphologically the etiology of a disease and the reason for its course, and to determine the pathognomonic lesions; on this basis alone, and on the basis of experimental histopathology, can it command treatment as an entity. The range of one's knowledge of the general principles of histopathology determines the whole depth, breadth and fertility of one's medical thoughts and actions.

In accordance with systematic teaching of histopathology, the text matter in the present work is divided into three parts. The first part, "General Pathology of Cells and Tissues," forms an introduction into the fundamentally important changes of cells and tissues, and the rules incident to their development. The second part, "Special Histopathology," contains a prudent selection of characteristic disease conditions of importance to the veterinarian. Special emphasis is placed on pathogenesis and on histological diagnostics. The third part, "Comparative Histopathology," is an attempt to bring into relief the common laws underlying the various histological reactions of the more important disease groups and their relationship.

In this chapter the student is shown that the endless multiplicity and dissimilarity of histopathological lesions can be reduced to a comparatively few and simple principal forms (from the author's introduction).

The book contains 195 pages of text matter, five tables, five diagrams and 142 illustrations, all clear; some in colors. The volume is carefully indexed. These features, coupled with the soundness of the teachings of the author, a former associate member of the Rockefeller Institute for Medical Research, Princeton, New Jersey, and now Chief of the Institute of Animal Pathology, University of Munich, Germany, make this treatise a valuable and handy supplement to the textbooks on human histopathology in use at our veterinary colleges.

Dermoid Cyst in Testicle of a Cryptorchid

March 5th, I was called to operate on a cryptorchid. The animal was cast in the usual way and anesthetized and an opening made over the inguinal canal.

The animal had not been gaunted and this combined with other difficulties made the task of locating the missing gland somewhat difficult. However, after ten minutes' search, I managed to bring it into view, and to my surprise it was cystic and apparently had never functioned. The spermatic cord had completely degenerated, the gland being suspended by a few threads of tissue. On opening the cyst it was found to contain a quantity of hair, seemingly mane or tail hair, and a piece of bone about two inches long and about one and one-half inches wide, concave in character. This I recognized as a dermoid cyst. Obviously the colt never showed the slightest sexual desire; but the owner, wishing to dispose of him could not do so, knowing him to be a ridgling.

I operate upon 40 to 60 ridglings a year and in 28 years in practice, I have never met with a similar case. Naturally I have seen dozens of dermoid cysts in general practice both in horses and cattle, but this was my first in a testicle of a cryptorchid.

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Abstracts

Dyspnea in Newborn Calves due to Fracture of Ribs

In the course of difficult delivery[60] when the fetus is voluminous and the pelvic path narrow as is often the case in primapara, a succession of dull crackling sounds, which cannot be accounted for by any damage found in the dam, can be attributed to fracture of the calf's ribs from the severe compression of its thorax after the head has passed beyond the pelvic border.

The victim of this accident, from several hours to more than a week after delivery, develops a fatal dyspnea—roaring—due to the regenerative callouses crowding the organs entering the thorax (trachea, bronchi, nerves). Several days after birth, the calf otherwise presenting every sign of good health, develops respiratory distress and obstructed deglutition. The symptoms are noisy breathing and mouth breathing, ptyalism, diffcult deglutition, congested mucous membranes, absence of fever, standing with the shoulders apart to increase the breathing capacity, fixed standing attitude in fear of increasing the respiratory distress by moving or lying down, atrophy and stretching of the pectoral and serrated muscles and the otherwise good state of health, coupled with the history of a difficult delivery, establishes the diagnosis. The callouses can also be detected by palpation of the anterior part of the thorax, an easy matter in the young.

Evidence of non-fatal cases of this parturient accident is found in meat inspection but usually has been attributed to rickets or bone tuberculosis.

* * * *

Treatment for Metritis

The various conditions resulting from endometritis are amenable to treatment with Fissan-uterus capsules.[61] Healing is brought about by the minute surface dispersion of the active principle, by the intensity of the action, by the germicidal power, by the binding of the toxins and by the stimulation toward involution of the uterus. Repetition of the treatment after about five to eight days is to be preferred to single treatment. In the case of an endometritis catarrhalis chronica, treatment preliminary to the application of the capsules is unnecessary. In other forms of endometritis it is recommended to aid the therapeutic action by evacuating the secretions and by massage of the uterus per rectum. The Fissan-uterus powder is to be preferred to other preparations by the fact that it does not stain the hands dark.

* * * *

Leucemia of Cattle Hereditary

After years of study the author[62] succeeded in 1930 in discovering the fetal origin of leucemia in cattle. The leucemia in the fetus was localized in the subcutis of the region of the flank, a rather rare seat in the fetus, as well as in adult cattle. Since then the author has been able to diagnose the fetal transmission of leucemia in practically all the cases of emergency slaughtering of leucemic cows. Katzke believes that the hereditary quotient of leucemia in cattle will approximate 100 per cent.

* * * *

The Influenza Group in Horses

Infectious brochitis of horses[63] is caused by a filterable virus which is pathogenic for all breeds. The incubation period is from two to three days. The principal clinical symptom is a deep, dry cough. Complication with secondary invaders produces a bronchopneumonia. The disease is easily transmitted from horse to horse. The virus is also transmissible to pigs and cattle; in the latter it is probably the cause of infectious bovine bronchitis. Infectious bronchitis is identical with diseases described under the following

[60] Moutaux, M le Dr. Fractures des cotes et cornage chez le Veau (Fracture of the Ribs and Roaring of the Calf). *Recueil de Médecine Vétérinaire*, 60:6, June, 1931.

[61] Lentz W., 1934. Neuzeitliche Behandlung der Endometriden (Modern treatment of Endometritis). *Berl. Tierärztl. Wchuschr.* 50:29, pp. 483-484.

[62] Katzke, 1935 Die fetale Leukämie des Rindes (Fetal Leucemia of Cattle). *Zeitschr. f. Inf.-Krkh.*, etc., *der Haustiere*, 47:2, pp. 161-165.

[63] Waldmann, D. and K. Köbe. 1935. Der Seuchenhafte Husten des Pferdes (Infectious Bronchitis of Horses). *Zentralbl. f. Bakt. I. Orig.*, 133 (½), pp. 49-59; Abst. *Tier. Rund.*, 41:11.

names: Hoppegarten cough, epizootic laryngotracheitis, infectious respiratory catarrh, scalma, influenza, Brüssel disease, infectious bronchopneumonia.

* * * *

Heart Involvement in Horses

The author[64] describes two cases of heart disease which were presented on account of colic symptoms. One horse exhibited a paroxysmal tachycardia. The intravenuous injection of bihydrochloric chinin (1:10) resulted in slowing the heart action from 80 to 48 beats per minute. The other horse suffered from a chronic failure of the heart valves. Application of chinin likewise had a favorable, although more transitory action upon the heartbeat. The additional treatment with digitalis finally mitigated the symptoms of decompensation.

* * * *

Stuttgart Disease

The regular presence of spirochetes in the kidneys of dogs affected with Stuttgart disease appears to prove that this morbid entity is essentially a spirochetosis.[65] The method of Levaditi gives the best results in searching for the organism in sections of renal tissue prepared with formalin. The lesions are those of massive nephritis. The author found spirochetes in 97 out of 107 cases examined. The parasites were agglomerated in the glomeruli. Examinations of 30 healthy dogs for the parasite were negative. No benefit was derived from the use of salvarsan.

* * * *

Hog Cholera Virus Viability Tests

Chloroform and ether have no action against the virus of hog cholera.[66] Virulent blood treated with one per cent chloroform was still active after 68 days. *Per contra* suspensions of pulp of liver and spleen of cholera affected hogs treated with 0.2 per cent of formalin were inactive in nine days at a temperature of 37°C. Injections of these formalated emulsions subcutaneously in young pigs protected them against experimental infections 25 to 44 days after the vaccination.

* * * *

Tissue Cultures and Their Application

Keeping certain metazoan[67] tissues alive indefinitely and causing them to multiply in artificial nutritive media has become precious among anatomists, histologists, physiologists, pathologists, and pharmacologists in comparing dead tissues, fixed or colored, with living tissue, and watching the behavior of the latter when removed from the influence of the nervous and circulatory systems. It is the method of choice in the study of cellular genealogy. It also furnishes the bacteriologist with the only means of culturing ultra-viruses and of studying the rôle played by cells in immunity reactions. The pharmacologists and biochemists hope by this means to replace tests on the living animal with tests on living cells *in vitro*.

The author reviews the work in this connection through successive stages and methods since 1884. The technic of the process is minutely described in respect to the extreme care required in selecting and preparing the media, methods of collecting and cultivation, and the observation of the migration and proliferation of the cells seen growing on the contour of the specimen under cultivation. When conditions become unfavorable the specimen dies and takes on an entirely different aspect.

The effect of various therapeutic agents on tissue cultures has considerable interest.

Carbon dioxide, even at 79 per cent is not toxic; one per cent ethyl alcohol stimulates the proliferation of fibroblasts; butyl and isopropyl alcohol are noxious; chloroform and epinephrine inhibit the growth, and pilo-

[64] Wirth, D., 1934. Chininwirkung bei Herzfehlern gweier Pferde (Chinin-Action Upon Heart Disease in Two Horses). *Wein. Tierärztl. Mschr.*, 21:22, pp. 689-692; Abst. *Tier. Rund.*, 41-43.

[65] Lukes. Spirochétose du Chien (Maladie de Stuttgart) (Spirochetosis of the Dog, Stuttgart Disease). Prat. Arch. f. Tiedmed. 6: p. 233. Ext. *Rec. de Méd. Vét.*, 60: 6, p. 350, June, 1934.

[66] Monteiro da Costa. Quelques essais d'immunization active contre la peste porcine (Some Tests on Active Immunization Against Hog Cholera). Abs. *Rev. de Path. Comp.*, 35: 400, January, 1935.

[67] Lombard, Prof. Charles. La culture des tissues et ses applications. (The Culture of Tissues and Its Application.) Rev. *Vét. et Journ. de Méd. Vét.* 87: January, 1935, pp. 13-45.

carpine at 0.5 to 2.5 per cent excites it; iodine produces no unfavorable action; iron is very toxic; lead, gold and platinum are stimulating; arsenic inhibits; bismuth is well tolerated; permanganate of potassium kills the growth at 1:80,000, etc., through a large group of familiar therapeutic agents.

Tests made to determine the relative tolerance of staphylococci and tissue cells show that iodine, mercuric chloride and neosalvarsan were the least harmful to cells. The latter kiled the staphylococci in a dilution of 1:30,000 to 1:40,000 without injury to the growing cell of the specimen.

Although these findings are fascinating, it is, however, in the study of cancer that the most fruitful observations are expected to be revealed. Tissue cultures are rich in promises for the future of medicine.

* * * *

Fowl Paralysis

Seagar's[68] researches were made on 248 fowl from several days to a year old. He arrived at the following conclusions:

1. The experiments showed clearly that the etiological agent of the disease is an ultramicroscopic virus and not a cellular element.

2. The virus acts at once upon the brain, the spinal cord, and the peripheral nervous system.

3. The principal symptoms may not reflect upon the central nervous system but result in nervous lesions of the different organs.

4. The virus can provoke cellular hyperplasia simulating tumor growth in various organs, especially in the ovaries.

5. Lesions of the iris are often constant.

6. Lymphcytosis is the rule in acute cases.

7. The virus can remain latent for several months or until an occasional factor causes an attack.

8. The period of incubation is more than two months.

9. Natural infection is produced through the eggs or by ingestion; the intestinal mucous membrane being the portal of entrance.

* * * *

Twelfth International Veterinary Congress

Of the many narratives of the journeys of the foreign delegates to the twelfth international veterinary congress,[70] the one published in the *Munchener Tierarztliche Wochenschrift,* chronicling the adventures and impressions of the German group, easily holds the interest of the reader, because of the entertaining style, the excellent powers of observation, and the keen sense of humor of the author, Doctor Nörr, Munich.

The itinerary opens with the meeting of the German veterinarians in Hamburg. From there they travelled to Cuxhaven, where the group embarked on the Hapag liner "Hamburg." The passage was under the sign of mourning for the late president von Hindenburg. About twenty pages are given to record the impressions of New York City and the meetings of the veterinary congress. The remaining pages give an account of the travel to Ithaca, N. Y., Niagara Falls, Detroit, Mich., Chicago, the World's Fair, Washington, D. C., Bethesda, Md., Beltsville, Md., Philadelphia and Atlantic City.

The narrator was favorably impressed by the special congress issue of VETERINARY MEDICINE particularly with the welcome to the foreign delegates, printed in the four official languages of the congress and the information given about American veterinary educational institutions.

The narrative, which was continued in several issues of the magazine, was later issued in attractive pamphlet form carrying on the cover a reproduction in gold of the design of the official badge of the congress. The return trip was made aboard the "Albert Ballin."

[68] Seagar. *The Veterinary Journal,* Oct., 1933. Abs. *Revue Vétérinaire et Journal de Médecine Vétérinaire,* 86: 576, Oct., 1934.

[70] Norr, J. 1934. Eindrucke vom XII. tierarztlichen Weltkongress in New York. (Impressions from the Twelfth International Veterinary Congress) 51 pp. Reprint from the *Munch. Tierarztl. Wochnschr.* 85.

Draining the Pericardial Sac in a Horse

In an eight-year-old horse, exhibiting cyanosis,[71] injection of the vessels of the skin, and edemata on the chest and the abdomen, the diagnosis of hydropericardium was made. The puncture of the heart-sack was made as follows: the posterior region of the sternum was shaved and a five centimeter long incision in the median line was made. The periosteum was opened and the sternum was perforated with a small trepan. The wound was cleaned and then a trocar was thrust in the direction of the fifth and sixth rib. Altogether 700cc of exudate was collected. The wound was closed with collodium and mustard was applied to the region of the heart. Spartein sulfate was given every hour. A valvular insufficiency complicated with a mitral stenosis remained, but after thirteen months was found to be entirely compensated.

Recurrent "Stifling" in Colts

The recurrent lateral dislocation of the patella[72] in colts is characterized clinically, by a mechanical disturbance of locomotion caused by the dislocation and by the symptoms of arthritis of the patellar joint. The motor disturbance is essentially a shortening of the stride, sometimes a slight flexion of the knee-joint when the foot is placed down, and frequently by a slight lameness. Occasionally lateral dislocation of the patella may be observed. By putting the hand upon the patella, while walking alongside the colt, the lateral movement of the patella may be felt distinctly; at the same time, a slight sound may barely be audible. On palpation one notices that the patella is loosely connected and can easily be moved about with the hand. The lameness is caused by the chronic arthritis. The arthritis usually results in hydrops of the joint, whereby the joint is often swollen to the size of a fist; this swelling is fluctuating. Inflammatory processes are absent. Therapy is of little use. When arthritis has not set in, the application of liniments, and rest from work may give relief.

Characteristics of Synovia

The opinion of American authors that a higher viscosity of the synovial fluid is indicative of the presence of defects in the articular cartilege is confirmed.[73] There is a relationship between the amount of mucin-like substance present in the synovia and the degree of viscosity. The question is raised whether it is possible that in older animals the production of this mucin-like substance may be taken over by the cartilaginous grooves as a compensatory process, since the cartilaginous grooves do not seem to be a pathological formation.

Intrapalpebral Test for Bang's Disease

Various types of *Brucella abortus* were grown upon sugarbroth,[74] and incubated from 20 to 30 days. Agglutinating serum was added until clarification took place; then, 0.5 per cent formaldehyde was added. The clear fluid was harvested and used for injecting into the eyelids. The dose for sheep and goats is 1cc, for cattle 2.5cc. The diagnosis is positive when there is a severe swelling of the eyelids after one to three days, lasting for at least two to three days.

Tests on 3,471 goats, 257 sheep, 226 cattle gave 609 positive reactions from the brucellin test, and 241 positive reactions from the agglutination test whereby a titer 1:50 was considered positive.

The great number of positive cases with brucellin gave the impression that the brucellin test may not be specific. Therefore the milk of the positive reacting goats was centrifuged and the sediment was injected subcutaneously into guinea pigs. Their blood became agglutinative. *Brucella abortus* was isolated from the tissues.

[71] Negri, F. 1934. Exudative pericarditis in a horse relieved by paracentesis through the sternum. (Transl. title.) *La Nuova Vet.* 10: pp. 407-409.

[72] Pfeiffer, W. 1935. Die habituelle laterale Dislokation der Kniescheib ebei Fohlen. (Recurrent lateral dislocation of the patella in colts.) *Münch. Tierarztl. Wchnschr.* 86(15):169-170.

[73] Luy, P. 1935. Beitrag zur Kenntnis der Synovia und zur Funktion der Synovialgruben des Rindes. (Function of the synovia and of the synovia grooves in cattle.) *Tierarztl. Rundsch.* 41(11):173-177.

[74] Bisanti, C. 1934. The "Brucellin Miri" as an allergic diagnostic for brucellosis. (Transl. title.) *La Clin. Vet.* 10: pp. 795-799.

Brucellin has the advantage of giving more uniform results than the agglutination test. Thus of 157 goats, 117 reacted positively to the agglutination test repeated after one month, while of 374 goats, 369 reacted positive to a second brucellin test after one month.

Influenza in Cattle

An eight-year-old cow exhibited fever,[75] cough, dyspnea, accelerated pulse, conjunctivitis and rhinitis. Further examination disclosed hypersensitivity of the larynx and the pharnyx, and pneumonia. Two days later, nine additional cattle were found to share the same symptoms. A peculiar characteristic was the painful dry cough. In some of the cattle a tracheal catarrh prevailed, in others a pneumonia. One sick cow was associated with a well one for twelve hours; it communicated the disease to her. After ten days all animals, with the exception of one steer, had recovered. The disease was diagnosed as influenza.

Iodine Treatment of Mastitis and Other Infections

Sodosept[79] is a proprietary iodine solution in which the action of iodin takes place solely in the presence of acid-producing organisms. The preparation is available in tablet form; it is manufactured by the firm "Chemische Fabriken Dr. J. Wiernik & Co., A. G. Berlin-Waidmannshut."

In 42 cases of mastitis parenchymatosa the injection of 50 to 100cc of secretions of the diseased quarters, sterilized with iodosept, effected prompt recovery. The placing of six to 8 tablets of iodosept in the uterus of infected cows and the vaccination of exposed cattle with 15cc of an abortus Bang culture, killed with 5cc of iodosept eradicated abortion from the infected premises very successfully. Sodosept has proved valuable in infection of the os uteri, in uterine catarrhs, in trichomonas infections and for various prophylactic measures. Good results were obtained also from its intrametral application for the prevention of sterility in 25 mares. For the treatment of retention of the abterbirth in the mare, the introduction of eight tablets into the uterus is recommended. Treatment of fistula of the urachus with injection of 20 to 40cc of iodosept solution has likewise proved successful. Blood to which sodium citrate and iodosept has been added, intended for blood tranfusion, will not spoil, even if stored over a long period of time.

Ether-Serum Treatment for Tetanus

A two-year-old colt, having tetanus,[69], received 200cc of antitetanic serum intravenously, and two hours later 150cc of ether in vaseline-oil rectally This treatment was continued for twelve days. On the seventh day a distinct improvement was noticed. On the twenty-second day, complete recovery was observed. The second case concerned a draft horse with tetanus. It received 200cc, serum daily for five days, without apparent improvement. On the sixth day, serum-ether treatment, as above, was begun. After ten days the horse was able to eat. Complete recovery took place after 32 days.

Predeterminating the Sex in Mating

The results of the Russian investigator Kolsow are reported.[76] By means of cataphoresis the sperma is separated into two groups. The X-chromosome carrying germcells will collect at the anode, while the germcells lacking the X-chromosomes collect at the cathode. Does artificially inseminated with the anode sperma gave birth to females only, while does artificially inseminated with the cathode-sperma gave birth to four males and one female. The partial failure in the latter experiment is excused by the imperfection in the apparatus for the separation of the sperma.

[75] **Ventura, L. 1934. Influenza in cattle. (Trans. title.)** *La Nuova Vet.* **10: pp. 406-407.**

[79] **Lichtenstern, G. 1935. Das von dem Nobelpriesträger Prof. Pregl hergestelle Jodosept in der Tierheilkunde. (The use of Sodosept in veterinary therapeutics.)** *Münch. Tierärztl. Wchnschr.* **86 (14): 157-166, (15): 171-174.**

[69] **Guerrschi. A. 1934. Serum-ether treatment of tetanus in horses. (Transl. title.)** *La Nuova Vet.* **12: pp. 474-475.**

[76] **Schmidt, A., and Henseler, H. 1934. Wilkürliche Besin flussing des Geschlechts. (Influencing the sex in mating.)** *Deutsch Kynologen Ztg.* **16 (23): pp. 727-728.**

Students of the School of Veterinary Medicine, Texas A. & M. College. Members of the Texas Junior Chapter of the A. V. M. A.

HONORS PAID DEAN FRANCIS

Various organizations of the state paid high tribute to the man and the scientist Mark Francis, dean of the School of Veterinary Medicine and Surgery, Texas Agricultural and Mechanical College, on the occasion of his seventy-second birthday, March 19, 1935.

Connected with Texas A. & M. College since 1888 and as dean of the veterinary school since 1916, Doctor Francis is nationally known for his work toward elimination of Texas fever from cattle ranges of the Southwest and for much other valuable veterinary research.

He was especially honored at the Southwestern Exposition and Fat Stock Show in Fort Worth during March on attending the exposition as the guest of the management and the Texas Hereford Breeders' Association. He was named honorary vice-president of the exposition and was honor guest at the "Mark Francis Dinner" given by the Texas Hereford Breeders' Association which dedicated its annual banquet to him in commemoration of his scientific contributions to the livestock industry of the state.

At the dinner in Fort Worth, Doctor Francis was presented with a scroll by the host organization in co-operation with the Texas and Southwestern Cattle Raisers' Association, which read as follows:

"In recognition and sincere appreciation of the service he has rendered the livestock industry of Texas and the entire country, his many years of research on Texas fever and his successful work in overcoming this dreaded cattle disease and making it possible to improve our cattle with better blood, the value of his scientific research regarding other animal diseases and the important economic bearing it has had on the livestock industry, his great work as a teacher and scientist in the field of veterinary medicine and surgery, his unselfishness, his devotion to duty, his common sense philosophy, and his admirable qualities as a man and citizen whose influence for good has been so pronounced among thousands of students and livestock men to whom he has lectured during the half century he has served the A. & M. College of Texas, this scroll is respectfully dedicated with highest esteem and affection to Dr. Mark Francis, D.V.M., L.L.D., Dean of the School of Veterinary Medicine and Surgery of the Agricultural and Mechanical College of Texas, College Station, Texas."

Lated Doctor Francis was the honor guest at a birthday banquet given at the college by the Junior Chapter of the American Veterinary Medical Association. More than 100 officials of the college and students and former students attended. All deans of the college and other faculty members spoke on the program which was broadcast over Station WTAW. J. O. Whitehead, Smith Point, chapter president, was banquet chairman, and Charles Coleman, Alpine, junior veterinary medicine student, was toastmaster.

An unusual feature of the program was that three of the speakers, all prominent members of the college faculty, at one time studied under Dr. Francis. These included Dean E. J. Kyle, of the school of agriculture; Dean C. H. Winkler, of the school of vocational education, and Dr. H. Schmidt, acting chief of the division of veterinary science, Texas Agricultural Experiment Station. Other speakers included Dean F. C. Bolton, of the college and of the school of engineering; Dean T. D. Brooks, of the graduate and arts and sciences schools; Dr. R. P. Marstellar, vice-dean of the school of veterinary medicine and surgery; Lt.-Col. A. R. Emery, professor of military science and tactics and head of the college military department; D. W. Williams, head of the animal husbandry department; Dr. A. E. Wharton, of the veterinary medicine staff. President T. O. Walton of the college, unable to attend on account of being called away from the college on business, was represented by Dean Bolton, who read an address prepared by President Walton for the occasion. In this, President Walton reviewed the work of Doctor Francis both as a scientist, a teacher and a man.

The college junior chapter of the American Veterinary Medical Association, which gave the banquet, has a membership of 107. Enrollment in the School of Veterinary Medicine and Surgery at Texas A. & M. College for the 1934-35 session is 120, the highest in the history of the college.

ARMY VETERINARY SERVICE

Major Raymond Randall is assigned to duty at the Boston quartermaster depot, Boston, Mass., effective upon completion of his present tour of foreign service in the Panama Canal Department.

So much of special orders as assigns Major Ralph B. Stewart, to duty at Fort Des Moines, Iowa, upon completion of his tour of foreign service in the Philippines is amended so as to assign him to duty at Fort Riley, Kans.

So much of par. 59, S. O. 60, W. D., 1935, as relates to Major Kenneth E. Buffin is revoked. Major Kenneth E. Buffin is relieved from further assignment and duty at Fort Sam Houston, Texas, effective in time to comply with this order, will then proceed to Carlisle Barracks, Pa., and report to the commanding general not later than May 15, 1935, for duty.

Veterinary Reserve Corps

New Acceptances:

Hamman, Fred Irwin, 1st Lt., P. O. Box 216, Loveland, Colo.

Jones, Marion James, 2nd Lt., Box 481, Milaca, Minn.

Rash, Edd Ellis, 2nd Lt., 302 Federal Bldg., Cheyenne, Wyo.

Smit, Charles Rudolph, 2nd Lt., Alton, Iowa.

Promotions:

Catlett, James Garland to Lt. Col., 2418 N. Miami Ave., Miami, Fla.

Active Duty for Veterinary Reserve Corps Officers

Reserve veterinarians desiring active service with the Civilian Conservation Corps for a period of six months, or longer, should apply immediately to the commanding general, of the Corps Area in which they reside, for active duty.

CARY'S LAST VETERINARY MEETING

The Alabama State Veterinary Medical Association met at Auburn, Alabama, February 8th and elected Dr. C. A. Cary as delegate and Dr. I. S. McAdory as alternate to attend the A. V. M. A. meeting at Oklahoma City in August, 1935. The Alabama meeting was held at the end of the short course, which was more largely attended than any of its predecessors. T. H. Ferguson of Lake Geneva was chief lecturer and operator.

The following officers were elected by the Alabama association: President, T. M. Dennis, Vice President, G. T. Turnipseed; Secretary and Treasurer, C. A. Cary. Also about ten applicants were elected to membership.

C. A. Cary, Secretary.

Comment: Before the foregoing was received in the mail a telegram was received from Mrs. Cary announcing Doctor Cary's death. This communication was probably the last, certainly among the last, written by Doctor Cary.—Ed.

EASTERN IOWA VETERINARY CLINIC

The annual practitioners' clinic of the Eastern Iowa Veterinary Association will be held this year on June 18th, and as heretofore, at the Public Sales Barns of Dr. F. M. Wilson, Mechanicsville. Previous clinics held by this association have had an attendance of about 300 veterinarians.

KANSAS STATE BOARD EXAMINATION

Commencing at 8:00 A. M., Friday, May 24, 1935, the Kansas State Board of Veterinary Examiners will hold an examination for license to practice in that state. The examination will be held in the Amphitheatre of the Veterinary Building, Manhattan, Kansas.

The picnic-clinic of the Western Michigan Veterinary Medical Association will be held on Thursday, July 25, 1935, at the Fair Grounds, Ionia, Michigan. The secretary of the association, C. H. Haasjes of Shelby, promises a good program and a good time.

George E. Fetter, age 61, died at his home in Hopewell, New Jersey, April 22, 1935, after a four-months illness. Doctor Fetter had practiced at Hopewell since 1896, except for a period of 18 years during which he was employed by the Bureau of Animal Industry of the U. S. Department of Agriculture. He is survived by his widow, his son, five sisters and a brother.

MISSOURI VETERINARIANS WILL CONVENE AT ST. JOSEPH

The next annual meeting of the Missouri Veterinary Medical Association will be held in St. Joseph, Missouri, July 16 and 17.

The sessions will be held in the Chamber of Commerce Building, which is located close to both the Roubidoux and the St. Francis hotels.

Ashe Lockhart,
Secretary-Treasurer.

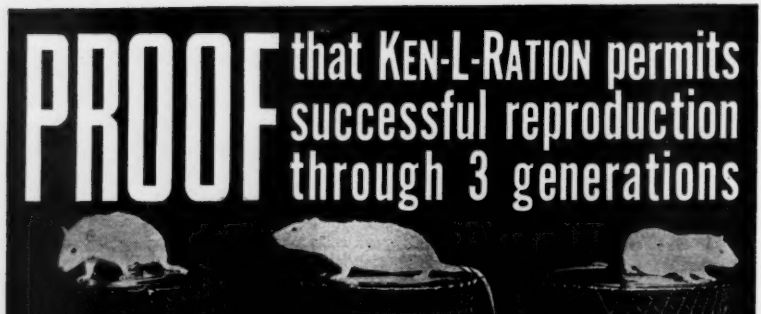
ILLINOIS SUMMER CLINIC

The Mississippi Valley Veterinary Association will stage another of its annual clinics at Peoria, May 25, 1935. This will be the third clinic arranged by this association. Both its predecessors have been noted for the number of patients presented at the clinic and the variety of pathological conditions demonstrated, and more than all else, for the excellent facilities afforded at the Fair Grounds and the splendid arrangement for orderly exposition, with an opportunity for all to see and to hear while comfortably seated.

DISEASES OF CAGED ANIMALS

J. A. Campbell, well known veterinarian of Toronto, Canada and Curator of the Zoological Park, Toronto, is the author of a series of articles in *Parks and Recreation*, "Ailments of Inmates in a Zoological Collection." The series began in the issue for March, 1935.

PROOF that KEN-L-RATION permits successful reproduction through 3 generations



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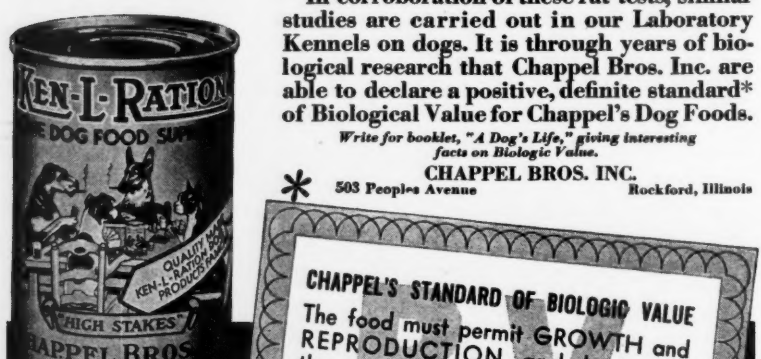
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NEW RESEARCH ON NUTRITION AT MELLON INSTITUTE

During 1934 Dr. Gerald J. Cox and Miss Mary L. Dodds, working on a fellowship at Mellon Institute of Industrial Research, conducted some studies of the fundamental causes of tooth decay. In consequence of their investigational findings Doctor Cox and Miss Dodds pointed out that there is thereby suggested the existence of a factor which, if present in the diet during a critical period of tooth formation, will aid in the development of teeth resistant to decay. It is now announced by Dr. E. R. Weidlein, Director of Mellon Institute, that this research is to be continued, along broad lines, through a grant for a period of one year from The Buhl Foundation of Pittsburgh. The investigation, which will be known as the Institute's multiple fellowship on nutrition, will be carried on in the Department of Research in Pure Chemistry.

In their preliminary studies during the past year the investigators observed a new type of experimental dental caries in rats that seems to be related to the diet of the animal, that is, of the nursing mother at the time of the formation of the enamel in the young. The appearance and location of the initial lesions indicate that the decay was not caused by fracture arising from coarse particles of food. As the lesions first appeared as opaque areas and later became open cavities, they were described as

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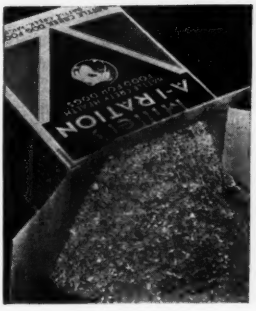

is ideal for hospital basic diets. It can be fed alone, or with milk, vegetables, or meat to vary the diet.

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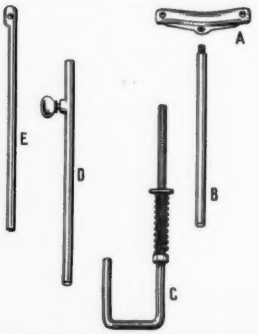

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closely resembling typical enamel caries in the human subject; it was therefore concluded that they probably arise by the same process in both species. Inasmuch as susceptibility to tooth decay in the rat appeared to be related to the diet during tooth formation, modifications of the maternal diet were made to determine whether the incidence of caries could be controlled; and it was found that caries appeared on diets made up with all the presently recognized essential constituents, although, when such diets were supplemented with certain milk fractions, or with milk itself, the incidence of caries was markedly reduced. These experimental results, which suggest the existence of a factor in food which plays a part in the formation of decay-resistant teeth, were recently summarized in Dr. Weidlein's Twenty-second Annual Report to the Trustees of Mellon Institute.

KANSAS COMPLETES T. B. TESTS

Kansas, on May 1, was officially recognized by the U. S. Department of Agriculture as the nineteenth state practically free of bovine tuberculosis. The state was thus established as a modified accredited area where tuberculosis among cattle has been reduced to less than one-half of 1 per cent. The other states are North Carolina, Maine, Michigan, Indiana, Wisconsin, Ohio, Idaho, North Dakota, Nevada, New Hampshire, Utah, Kentucky, West

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The testing of cattle for tuberculosis has been speeded up in Kansas during recent months through the use of emergency funds provided by the Jones-Connally Act. This work resulted in the rapid completion of testing in 31 counties which enabled the state to achieve its tuberculosis-free status.

The campaign to eradicate bovine tuberculosis is progressing rapidly in other states. During March 2,690,074 cattle in approximately 250,000 herds were tested—more than in any previous month in the history of the work.

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CANINE DISTEMPER COMPOUND

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However, a material has been found that, to all intents and purposes, takes the place of this *ptyalin*. In the presence of water it liquifies the starch cell, splitting it and putting it in such shape that the dog's digestive system can efficiently carry on.

Obviously, this makes Gaines Food go further as more cereals and vegetables are put to useful work. It reduces feeding costs but, more important, is the result that the starches, being digested, are passed on—not backing up to cause a myriad of skin troubles.

These Starch-Splitting Enzymes are only one improvement we've made in Gaines Food from listening to veterinarians. In fact, our whole formula represents a consensus of your opinions. It is, therefore, a Food you can recommend. Test it out—see if it doesn't change your ideas about commercial foods.

Test this improved Dog Food. We're sure you'll find it worthy of your recommendation. Just sign below—or mention VETERINARY MEDICINE and professional sample will be sent you without obligation. Also full details of our dealer proposition if we have no representation in your territory.

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